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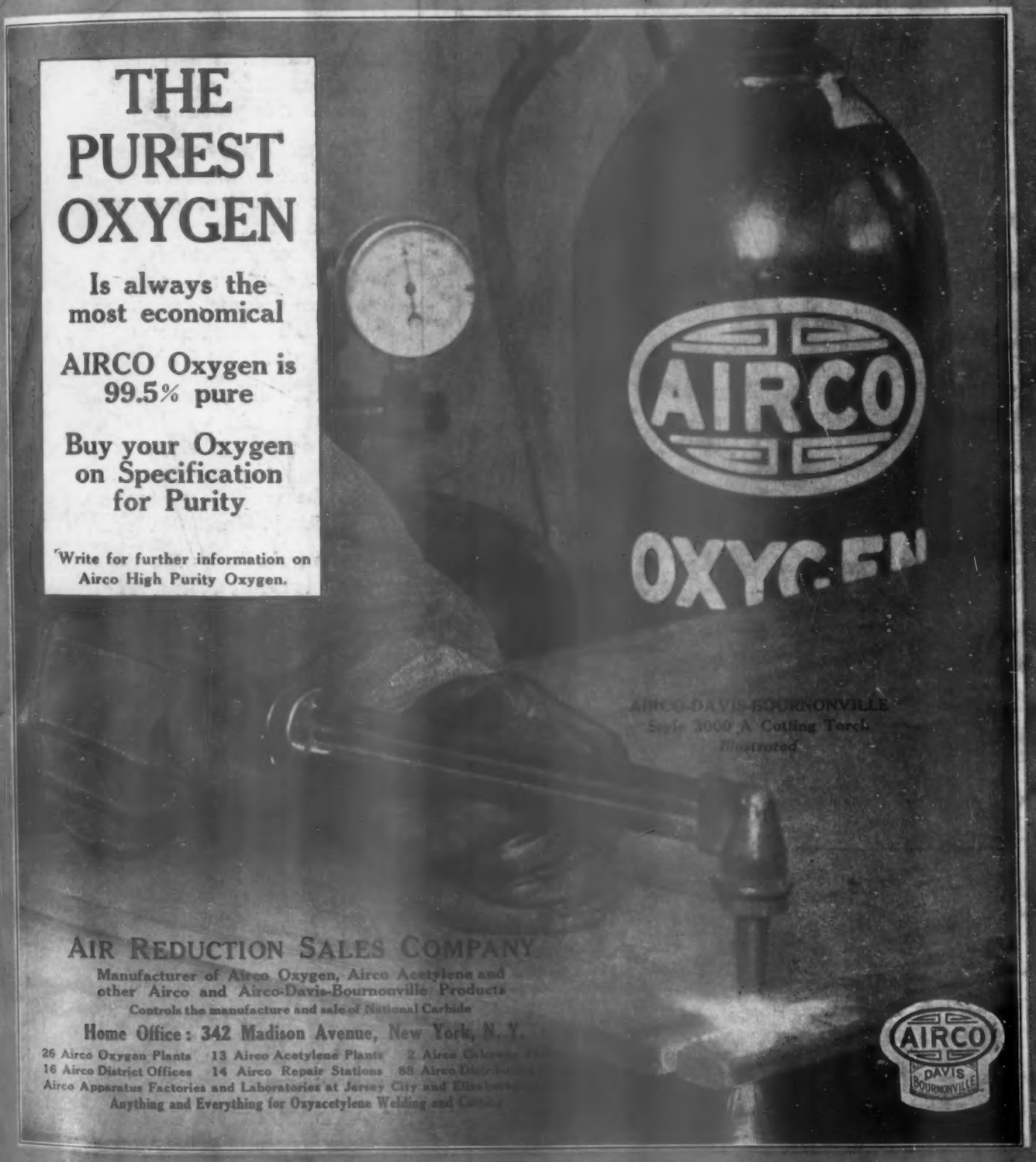
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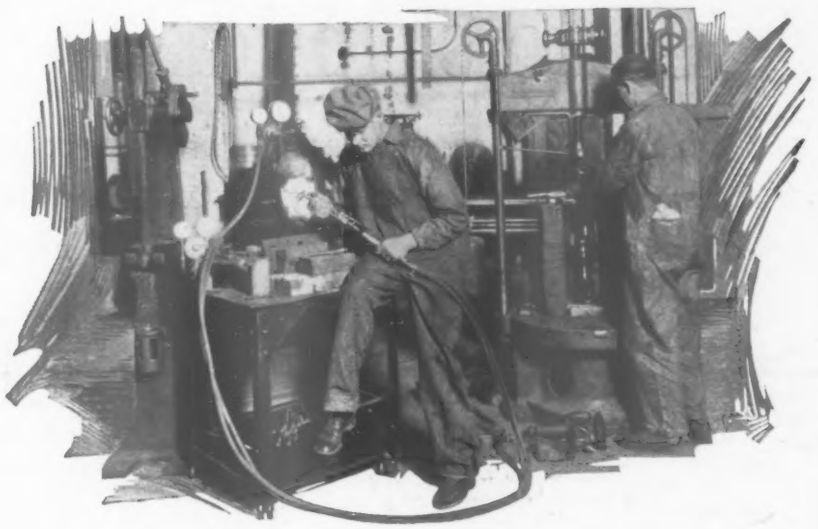
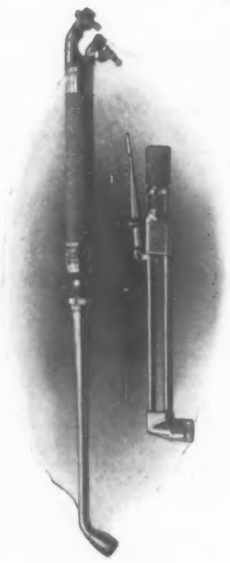


Solving the Torch Problem for the Small Shop



SHOPS, having only occasional welding or cutting work to do, must necessarily keep down their torch investment, but they must also be prepared to handle a great variety of such work quickly and efficiently, whenever it arises. This means that such shops must find welding and cutting equipment with a wide range of utility for a small investment.

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No. 9

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No. 50

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Buffalo....1345 Genesee St.
Garden City....Near Clinton Road Sts.
Geneva....261 Exchange St.
Hurleyville
Kingston....O'Neil St., Near Broadway
Niagara Falls
Poughkeepsie....Smith St. and C. N. E. R. R.
Utica....135 Hotel St.
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Whitehall....57-59 Main St.

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Raleigh..P. O. Box 149, McCullough & Lenoir Sts.
Wilmington....612 Surry St.
Wilson....700 S. Goldsboro St.

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Fargo....Fifth St. and Second Ave., N.

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Akron....97 East South St.
Athens....Corner Factory and Moore Sts.
Canton....618 Mulberry Road, S. E.
Cincinnati....67 Plum St.
Cleveland....1348 Hanna Bldg., Annex
Columbus....330 Dublin Ave.
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Lima....338 E. High St.
Mansfield....40 W. Third St.
Steubenville....324 N. Seventh St.
Toledo....414 S. Erie St.
Youngstown....Jones and Brittain Sts.
Zanesville....Main and 2nd Sts.

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SOUTH DAKOTA
Watertown....224 First Ave., N. W.

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Beaumont....366 Liberty St.
Dallas....Unit No. 2, Santa Fe Bldg.
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Wichita Falls....1507 Lamar St., P. O. Box 1002

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Weldite

Iron and Mild Steel Rods

Are offered Copper Coated for Gas Welding and
Bare or Flux Coated for Electric Welding.

THE WELDITE LINE

WELDITE No. 6—A very pure iron conforming to the American Welding Society specifications G-1A and E-1A.

WELDITE No. 10—A slightly higher carbon iron representing the very best in a general utility rod. Especially recommended for production work on tanks, boilers and sheet steel fabrication of all kinds.

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WELDITE No. 110—An extremely high carbon steel conforming to the American Welding Society specification E-1C.

A catalog describing each rod in detail will be mailed upon request

BACK of every WELDITE Rod are five years of painstaking experimental work conducted in our own Research Laboratory. The results are evident in the welding characteristics and uniformity of each rod in the WELDITE Line. They make better welds.

TO WELDING ROD AND SUPPLY SALESMEN

Much desirable territory is available for experienced welding supply salesmen under our agency plan. Correspondence is invited from men who want to establish a business of their own.

CHICAGO STEEL & WIRE CO.
103rd Street & Torrence Avenue, Chicago, Ill.
Manufacturers

Reliability!

Economy!

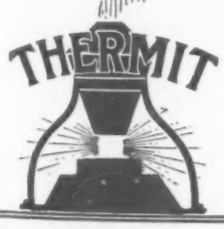
Thermit Welding, for more than twenty years, has been steadily consolidating its position in the welding field, and is now recognized wherever welds are to be made, as a method admirably adapted for use on both medium and large sections, and equally economical in both.

Thermit is prepared from only the purest materials, compounded under the supervision of a trained technical staff. Uniformity of composition is assured, and the steel produced has such high tensile strength, ductility and resistance to fatigue that it will withstand with ease the stresses and strains to which the weld is subjected.

No need to try to guess how much the member will contract on cooling! This has been accurately determined for any gap and section, and can be allowed for.

The low cost of Thermit Welding is definite, and can be counted on. We shall be glad to demonstrate this to you, and you can prove it yourself.

Send for Pamphlet No. 1879



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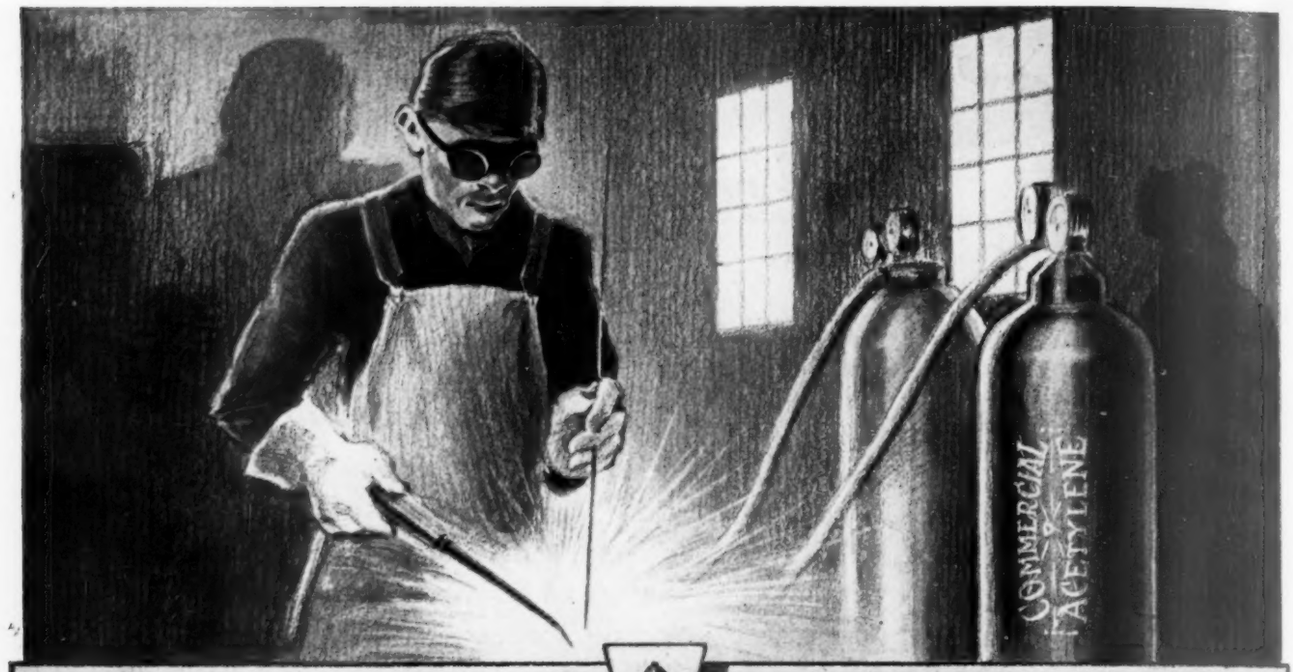

The right foundation for good cutting and welding is pure Acetylene

We supply it in:

Carload lots, truckloads or single cylinders.

Whatever your acetylene gas requirements may be let us quote you. Outline your gas consumption and our prices will be promptly furnished.

Supplied in the following size cylinders:

10x30in. size	- -	125 cu. ft. capacity
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COMMERCIAL ACETYLENE

Means pure acetylene.

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Means prompt service.

No matter what your gas requirements are you will be interested in our sales plan.
Ask our nearest office to tell you about it.

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General Office: 80 Broadway, New York City

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One Case Encloses All

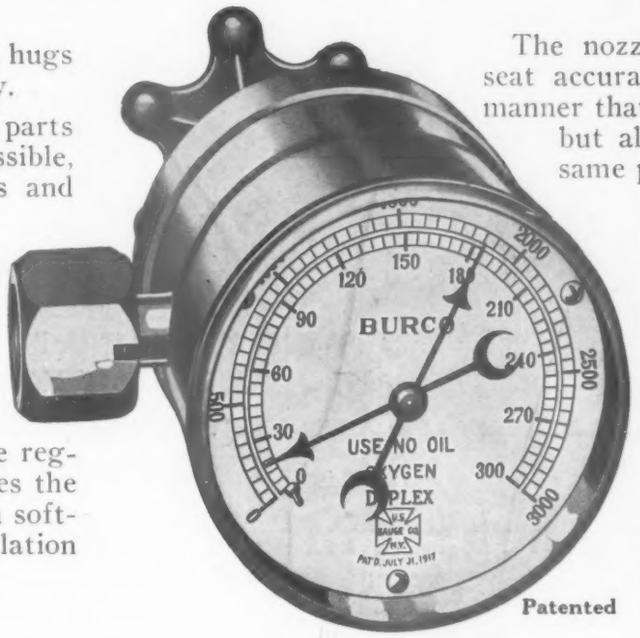
The BURCO STA-SET Regulator is constructed along distinctly new lines. It has many advantages.

It is compact and hugs the cylinder closely.

Internal working parts are quickly accessible, simplifying repairs and assembly.

The connecting nut to the oxygen cylinder is removable without unsweating the nipple.

It is a lever type regulator, which makes the spring action much softer and the regulation more accurate.



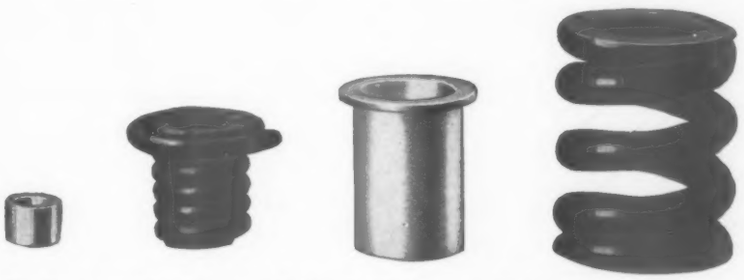
Patented

The nozzle is large and the seat accurately guided in such manner that it cannot be turned but always reseats in the same position.

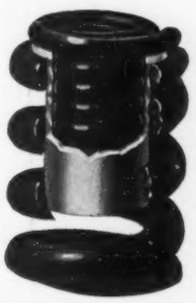
In operation this regulator delivers a full volume of gas under accurate regulation, with less fluctuation than is normally found in other regulators.

The large nozzle prevents freezing and accurate regulation means better welding at lower costs.

BURCO STA-SET REGULATOR NO. 3150



The Super-sensitive Expansion Spring for Welding, the Heavy Cutting Spring and Other Parts, Which Make Possible Sensitive and Accurate Adjustment for Both Welding and Cutting



The Welding Spring Nested Within the Cutting Spring

As now constructed all parts will give long service, but if necessary, the seat, nozzle or diaphragm can be renewed without special tools in *five minutes.*

Built in Three Styles—

No. 3150 BURCO STA-SET oxygen regulator for all welding and heavy cutting.

No. 3110 BURCO STA-SET oxygen regulator for all welding and medium cutting.

No. 3312 BURCO STA-SET acetylene regulator for all purposes.

BURDETT MANUFACTURING CO., 308-320 St. Johns Ct. Chicago, Ill.

SUN-LITE BRAND CARBIDE IS BEST!

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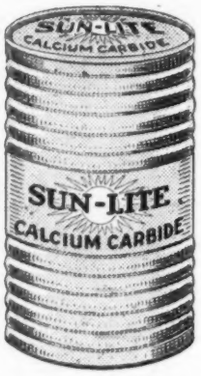

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Miners

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THE CAREFUL SELECTION AND INSPECTION OF RAW MATERIAL INSURES HIGH GAS YIELD WITH A MINIMUM OF IMPURITIES.

CORRECT GRADING ELIMINATES OVERSIZE AND FINES.

UNINTERRUPTED FACTORY OPERATIONS INSURE AT ALL TIMES AN ADEQUATE SUPPLY.

FAVORABLE RAILROAD FACILITIES INSURES
PROMPT SERVICE TO ALL INDUSTRIAL CENTERS

Gas Tank Recharging Company MILWAUKEE WISCONSIN

CARBIDE PLANT—Keokuk, Iowa *ACETYLENE PLANTS*—Bettendorf, Iowa; Milwaukee, Wisconsin

What is the essential property of welding goggles?

They must absorb dangerous light

Wellsworth Welders' Goggles with Noviweld Lenses are guaranteed by Wellsworth Scientific Laboratories. They can be depended upon to protect the eyes of your employees from dangerous light. Be sure you know that a welder's goggle actually protects, before it is allowed in your plant.

DANGEROUS ULTRA-VIOLET RAYS	VISIBLE RAYS	DANGEROUS INFRA-RED RAYS
■	NOVIWELD IN SHADES FROM 4 TO 14 REDUCES LIGHT TO A COMFORTABLE DEGREE FOR EACH TYPE OF WORK	■
NOVIWELD GLASS ABSORBS 99⅔% OF THE DANGEROUS U-V-	NOVIWELD	NOVIWELD GLASS ABSORBS 97% OF THE DANGEROUS I-R-

WELLSWORTH SAFETY DIVISION

American Optical Company

CHICAGO ST. LOUIS NEW YORK KANSAS CITY SAN FRANCISCO ATLANTA

Washington Herald April 19, 1925

LOCAL WELDER FIXES BIG MAIN

Sets Record for Metal Welding in United States, According to Expert.

The attention of the engineering world is drawn to Washington by the successful and extensive test being made in Georgetown in laying 4,000 feet of gas main. The long, tedious and expensive method formerly used, that meant leaking joints and sometimes impaired service, has been supplanted by the Matthews plan of electric welding of all joints.

When Ralph W. Matthews, of the Matthews Welding Company, proposed to the engineers of the Washington Gas Light Company that the joints be electrically welded, they were skeptical, but agreed to visit his establishment on Girard street and witness a test. The result was that he was told to "go to it."

Moving two of his big portable welding plants to M street, Matthews started demonstrating his point. He won.

"We have tested the mains already welded from Jefferson to Thirtieth street and there was not a leak," said Thomas F. Holden, assistant engineer, and thirty-nine years with the gas company. "This is the first welding job of the kind in the United States and we are as proud of it as is Mr. Matthews.

"In 1916, we laid three and eight-tenths miles of main, using the acetylene process. It was the first of the kind in the country. Other gas companies followed us. We now expect them to follow in using the electrically welded joint.

"The electrically welded joint is 100 per cent in strength. In fact, it makes the joint the strongest part of the main. It eliminates danger of leak or break there.

"In laying the 3,300 feet of 16-inch main and more than 600 feet of 12-inch main at this time, we are providing for the natural increase in gas consumption that is certain to follow the extensive growth in the northwest section; we also are having it laid before the permanent paving improvements are made to M street, thereby saving us considerable expense."

TODD TWIN POLE ARC WELDERS ELECTRICALLY WELDED 4000 FEET OF WASHINGTON, D. C. GAS MAIN IN HALF THE TIME!

ALL general welding repair shops are called upon to do considerable field work, necessitating the use of a gas-engine driven type of welder. Without this, it would be expensive to carry enough welding machines adaptable to various power circuits in different districts. In some cases available power is direct current. In others, it is alternating current of varying characteristics. In field work scaling, chipping, grinding and in some cases drilling is required. This means that an air compressor would be necessary in addition to the welding machine.

Equipment to meet all these demands would comprise approximately seven machines of various characteristics. For instance, one each the following: 110 volts D.C.; 220 volts D.C.; 550 volts D.C.; 220 volts, 60 cycle, 2 phase A.C.; 220 volts, 60 cycle, 3 phase A.C.; 440 volts, 60 cycle, 2 phase A.C.; 440 volts, 60 cycle, 3 phase A.C.

These machines would represent an expenditure of close to $7,000.

The Todd Twin Pole Arc Welder gasoline-driven types ER and ER2 are the most practicable for field work. In addition to providing power for welding, current is available for operating electric drills, grinders, chippers, lights, etc. The maximum power furnished for this purpose is 125 volts, 2 K.W. (2000 watts) for the ER type, and 125 volts, 2½ K.W. (2500 watts) for the ER2 type. This desirable additional power and light feature in no way interferes with the welding circuit.

Todd Welding Engineers are available for advice concerning requirements, etc.

Send for descriptive literature.

TODD TWIN POLE ARC WELDERS
25 Broadway **New York City**

TODD NEW YORK, U.S.A.

TODD WELDERS

High Carbon Electrodes

OPERATING OUR TWO 200 AMPERE ARC
WELDERS IN PARALLEL USING 1/2"
ELECTRODES "FILLING ON" A WORN
FLY-WHEEL PIT ON A 9" SHAFT. THE
WORM CRANK PIN HAS BEEN "FILLED
ON" AND WILL BE MACHINED TO
STANDARD SIZE.

Low Carbon Electrodes

By Courtesy of Washington Iron Works

ROEBLING WELDING WIRE

gives satisfactory service and demonstrates its efficiency and reliability. Exacting tests have proven that it possesses those qualities essential to good welding. If you are not using our welding wire, it amply merits your consideration.

John A. Roebling's Sons Company **Trenton, N. J.**

Cramp's Welding Rods

Parsons' Manganese Bronze

Rolled Welding Rods—The strongest bronze welding rods made for Oxy-Acetylene Welding and High Fire Brazing of Malleable Iron, Brass and Bronze. The use of Parsons' Manganese Bronze Filler Rods in brazing malleable iron results in the strongest possible weld or braze and insures satisfactory work.

We also furnish Welding Rods of Cast Iron, Copper Covered Iron and American Iron for welding steel, Vanadium Steel, Nickel Steel, Cast Aluminum, Drawn Aluminum, Soft Brass and Phosphor Bronze, also Steel Electric Welding Rods both flux covered and uncoated.

Cramp's Cast Iron Solder

for repairing Scored Cylinders and Water Jackets, etc. Thoroughly tried for several years by our customers and found entirely satisfactory.

Cramp's Aluminum Solder

A joint properly made with this solder is stronger than the original casting and is preferable to a welded joint.

CRAMP

We furnish and will be glad to estimate on all kinds of brass and bronze castings.

The William Cramp & Sons Ship & Engine Building Co., Philadelphia

"NATWELD"

Duo-Fold Safety Oxygen Gauge

Patented

Mechanically Perfect

Safety Accuracy Durability

UNCONDITIONALLY WARRANTED

And What's More—The Price Is Right!

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WORLD'S LARGEST MANUFACTURERS OF BOURDON SPRING GAUGES

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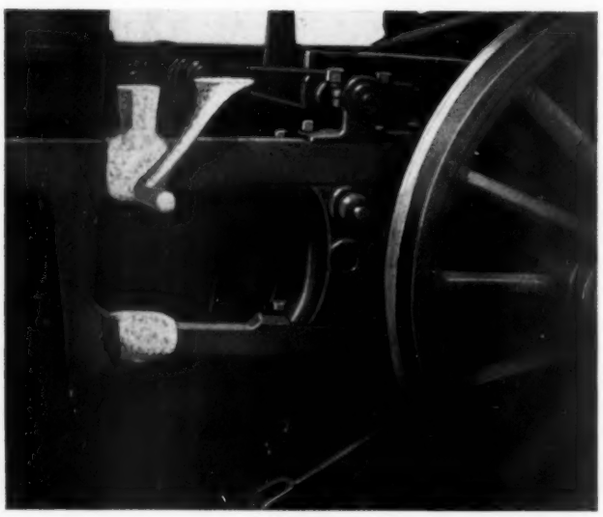
FERALITE

for welding all heavy steel and iron sections

FERALITE produces in bulk superheated liquid steel by the Alumino Thermic reaction. This liquid steel fuses with the sections to be welded, forming a single homogenous section.

FERALITE Welding of Locomotive Frames, etc.



The FERALITE weld fully equals in tensile strength and elongation the parent steel.

***FERALITE-Weld* all your locomotive frames, cross heads, guide yokes, rocker shafts.**

***Illustrated:* Two *FERALITE* Locomotive frame welds showing upper weld before removing gates and riser.**

FERALITE Welding in Mills and Foundries

The FERALITE weld fully restores broken rolls, pinions, rolling mill housings, rings, crankshafts, shears, charging machines for open hearth furnaces, spindles, cinder ladle frames, connecting rods, broken teeth in large pinions, etc.

The simplicity, economy and definite superiority of FERALITE welding is easily proved. Write now stating your requirements, and ask for prices, facts and figures. *Then use FERALITE and convince yourself.*

ALUMINO-THERMIC FERALITE TRADE MARK WELDING MIXTURE

ALUMINO-THERMIC CORPORATION
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Patronize Local Industries

For Convenience—For Service
For High Purity Oxygen

No matter where you are located, or what your oxygen requirements may be, you are assured of immediate service through the 53 plants of Gas Products Association, one of which is located near you.

In dealing with these plants you will aid in the support and prosperity of local industries. You will receive prompt and courteous attention. You will secure the highest purity oxygen.

Buy Pure Oxygen. Buy it at Home—when you need it—as you need it. Write or wire the plant nearest you.

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PENNSYLVANIA
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Norristown—Burdett Oxygen Co.
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Philadelphia—Paschall Oxygen Co.
Pittsburgh — Burdett Oxygen & Hydrogen Co.
Verona—International Oxygen Co.
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*Waco—Burdett Oxygen Co. of Texas
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*Everett—Washington Compressed Gas Co.
Seattle — Washington Compressed Gas Co.
*Tacoma—Washington Compressed Gas Co.

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WISCONSIN
*Appleton — Universal Oxygen Co.
*Fond du Lac — Universal Oxygen Co.
*Green Bay—Universal Oxygen Co.
Kenosha — Wisconsin Oxygen & Hydrogen Co.
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*Signifies warehouses

"I'll be bound"

THOUSANDS of copies of "Oxy-Acetylene Tips" can say this. This monthly magazine is saved and it is bound because the first number (August, 1922) is just as valuable for reference today as when it was published.

"Tips" is valued by every man from the president to the welder. It tells how to improve the work now being done. It suggests new welding and cutting operations. It points out economies. It is saved and bound because it aids in solving many problems.

"Something useful in every number"

"I have received copies of your publication, 'Oxy-Acetylene Tips,'" writes a welding foreman, "and like it so well that I do not want to miss future issues. There is something useful in every number, even to a welder who has been in the business twelve years, like myself."

"Tips" is free to all Linde customers. Ask the nearest Linde District Office to send you this monthly magazine which has "something useful in every number." For smaller shops Linde publishes another magazine—"The Linde Oxwelder." It's free, too.

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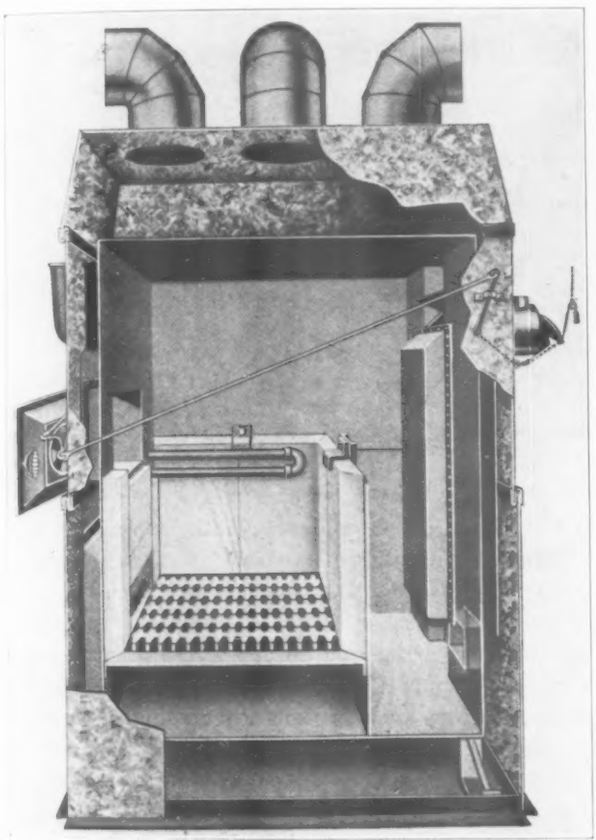
YOU CAN DEPEND ON THE LINDE COMPANY

Production Welders Since 1898

Chicago Firm Uses All Types of Welding to Good Advantage— Features Strength and Tightness of Welded Joints in Advertising

"YOU BET! We certainly do believe in welding in this plant. Welding gets a chance to do all the work it can. We've been established out here for fifty-two years and we have been doing production welding since 1898," said Mr. W. H. Hess, when he was asked concerning the advisability of using welding in production work. After this comment Mr. Hess and Mr. C. W. Janasik, of the Engineering Department, described the many welding operations which are regular practice in the plant. They do production and spot welding on all shapes and sizes from 22 to 10 gauge. The story is a splendid illustration of how nicely the various welding methods can be combined into a highly efficient production program, cutting manufacturing costs and yielding a superior product.



Cut-Away View of the Hess All-Welded Steel Furnace

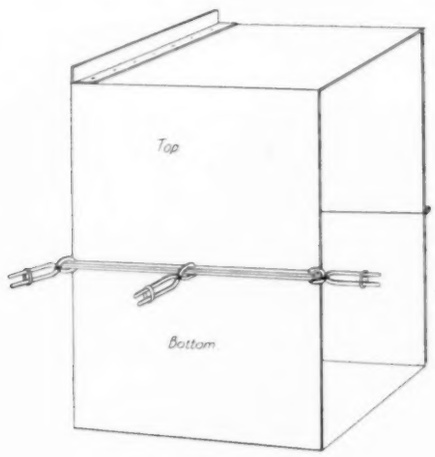
The welding operations in the Hess Warming & Ventilating Company, Chicago, are not confined to any one process. In fact, they could not very well get along with one process, as they explained. They have found just which form of welding best suits their particular requirements and best fits into their scheme of manufacture, and their plant is so systemized that it is recognized as the leading all welded steel furnace plant in the country. According to Mr. Janasik, they have received and filled orders for a number of foreign countries, the largest recent order for the all steel welded furnaces went to Russia. Other countries in which these all welded steel furnaces are in use are China, Japan, Korea, Russia, Sweden, Germany, England and Alaska. These orders have been placed by building contractors who have been firmly convinced of the superiority of the all welded steel furnace over the various other types of construction. Every day truck load after truck load of these heating units leave the plant on Western Avenue to go into active service in homes, churches, schools, stores and factories throughout the United States. This preference for the furnace, which is all welded, shows conclusively that welding is the best method of joining metals in a leakproof, strong, rugged union. That this is all true, is borne out by the guarantee which is placed upon each furnace. So convinced of the perfection of the welds is this company that they guarantee the welded seams for the life of the furnace.

Featuring Welding in Window Display

Comparing Furnace Constructions

In general the Hess company outlines several requirements which must be present in a good furnace and most important among them are the following:—

1—Capacious and convenient firebox; 2—Permanent joints which can never open or leak (welded joints); 3—Efficient radiating surfaces (sheet steel); 4—Freedom from repairs; and 5—Simplicity of construction. All of these factors have a direct bearing on welding for the welded joint makes them all possible. It makes it possible to have permanent joints, freedom from repairs, simple construction, and sheet steel material. None of these factors could be so well incorporated in these all welded furnaces by any other method of joining metals or making joints leak proof. Welding has solved their problem in the most satisfactory manner possible.



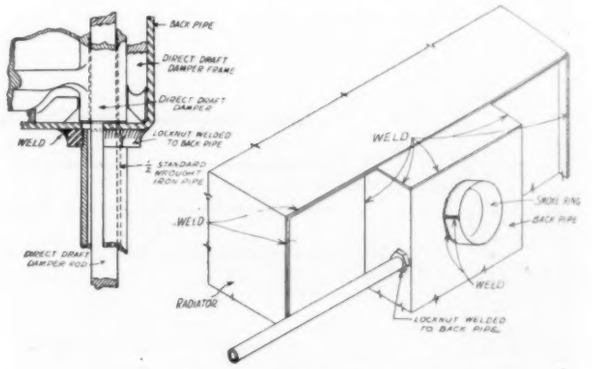
First Step in Assembling

It is claimed that these furnaces, due to their welded construction, last many years with little or no upkeep and that they are adaptable to any fuel. They differ from other furnaces in the following respects:—1—They are not made of cast-iron castings, 2—They are not made of a combination of cast iron sections and steel sections, and 3—They are not united with bolts or cement in any joints. The Hess furnace has a radiating section made of heavy annealed steel sheets in a square construction. In forming these radiators the various sheet steel parts (12 gauge) are bent and cut to the proper shape. They are then riveted along the seams to be welded. The rivets are put in very infrequently being used chiefly to hold the parts in place while the welding is being done. Of course, they are not removed after the job is finished, but remain as a part of the finished product.

A novel method is used to hold the seams together while the rivet holes are being punched and while the sections are being riveted together. This is illustrated in one of the sketches which shows large jawed pinchers clamped to the seams. The pinchers are held firmly clamped by means of steel rings, which slip over the handles and are forced down tightly.

The long seams on the radiator are electrically welded with an automatic arc welder, while the shorter seams and more intricate bends are fabricated by either the arc welding process or the oxy-acetylene process. Little preference is given to either one, it being merely a question of whether or not electric welders or gas welders are available at the particular time they are needed.

Great faith is shown in the welding which is done and in the men doing the welding, for throughout their entire series of literature on all of their various products the Hess company stresses the point, in bold letters, that the welded seams will withstand all sorts of abuse and that they are the strongest and ruggedest joints and seams that it is possible to make. They not only advertise this feature in their literature, but they also advertise it on their delivery trucks and in their window display. On passing the plant it is impossible to get by without seeing a cut-away section of the Hess All Welded Steel Furnace. And it is just as impossible to get by without reading the large



Detail of Welded Lock Nut

white letters painted on the black surface which say "Welded Seams", and then tracing the long white arrows which point to all the places where the seams are welded. Such confidence in the welding process is justified certainly by the fact that experience has shown their broad guarantee of welded joints to be perfectly safe.

Quoting from the guarantee:—"We guarantee that the welded seams of the Hess Welded Steel Furnace will not leak as long as the furnace shall stand. We guarantee the welded steel radiator (or inner body), with proper care and use, will not rust nor burn through during the first five years after installation." This guarantee surely is broad enough to convince any skeptic that welding is a thorough process, a process which can be relied upon and a process which can be guaranteed. Again quoting from their literature, "The welds are strong and clean, and, of course, absolutely and permanently proof against leakage. The firebox and ashpit are inside of the welded radiator, and gas and dust can never escape." "The welded, permanently tight construction of our furnace will allow none of the odor, fumes, or smoke to escape and enter the rooms."

Of course all of the welding in this plant is done on a production basis. The various parts are cut out in the most economical fashion and designed so that they can be stored in very small space, for this work they have a regular piling machine, which hoists the

parts into position on high piles. Long experience in building furnaces and particularly welded furnaces has given them a working knowledge of designing which allows efficient planning of the work. The parts are welded in such rotation that no time is lost and no man is crowding the others with more work then they can get out. The whole plant works in a smooth, rapid fashion. The various parts of the front and back of the radiator are welded together, and when the front is finished and the back is finished, the center is ready to have them welded to it. These various parts and the lines of welding together with the welded seams can best be explained by the line drawings and photographic illustrations which are reproduced here. They are self explanatory and will easily give one an idea of the great amount of welding which is done on every all welded steel furnace turned out by Hess.

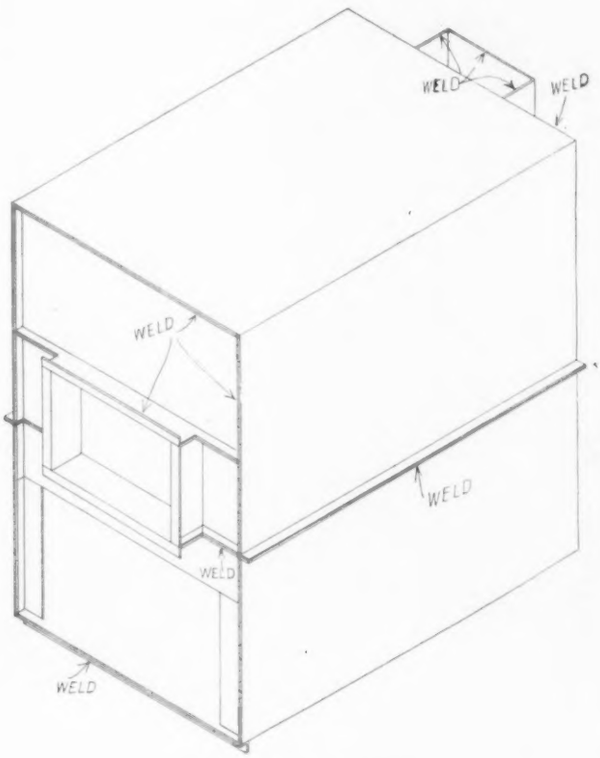
The Hess company does not confine its efforts

Automatic Arc Welder Used on Long Seams on Back Section. Clean-Out Opening and Smoke Ring Are Shown

entirly to the manufacture of furnaces. In addition to this fine piece of work they turn out an all welded steel bathroom medicine cabinet that is hard to beat in any respect. It is attractive in appearance, sturdy in construction, made of high grade material, given the highest degree of enamel finish that is attainable, and designed to correctly and efficiently meet the need it is intended for. The shelves are all readily movable, the bracket being permanently attached to the sides. Spot welding comes into the lime light here. The cabinet which is illustrated in this article is exceptionally beautiful. It has a convenient pocket shelf below; recessed style; polished plated glass mirror; adjustable and removable shelves; nickeled bronze hardware.

Welding again comes into play in the construction of the cabinet doors. These doors are made of pressed and welded steel. The shape of the door is pressed and the corners are mitered and welded together. The under side of the mitered joint has a reinforcing piece of metal spot welded along the joint. The ends of the joint which give the door its thickness are then welded by the oxy-acetylene process. A small diameter welding wire is used so that the door is as smooth as possible. In addition to the care which is exercised in the welding of these door frames, a grinder is used to smooth down the weld so that it will take a very high polish and give an exceedingly smooth finish for the enameling process. A portable type hand grinder is used and the results are perfect. When the finished product is turned out of the plant, it is impossible to tell that it has ever been welded anywhere.

Holes are punched in the sides of these cabinets and



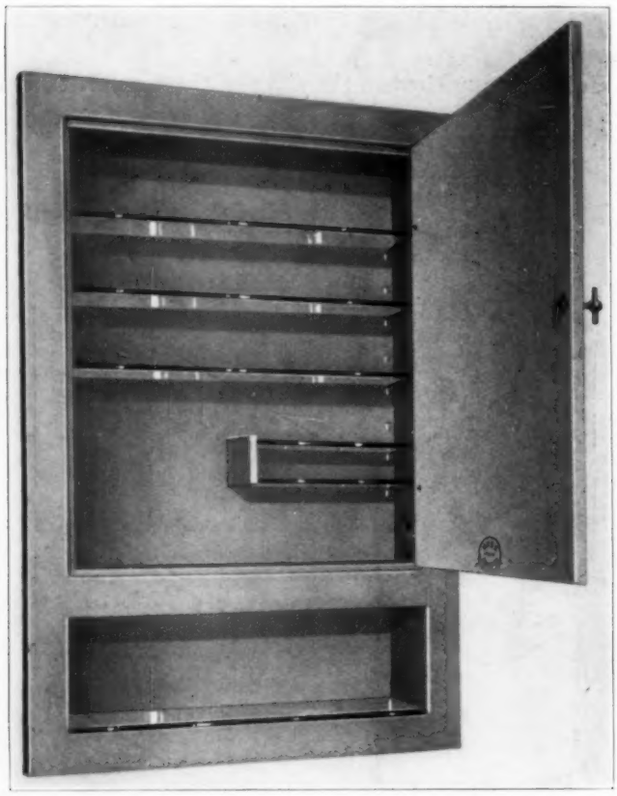
Sketch of Front of Radiator

through them the metal shelf brackets are pushed from the outside. This allows the brackets to be spot welded from the outside so that the inside surface of the cabinet is perfectly smooth. The permanent attachment of the bracket permits the ready adjustment of the shelf for one doesn't have to pull out the little supports and then put them back in another set of holes. The frames of the cabinet are also welded with the electric or oxy-acetylene process so that the construction of the cabinet is rugged and not subject to warping or distortion of any type. These cabinets are easy to install and their careful design, beautiful finish and their durability have caused them to be adopted as standard equipment by such places as the Loyola University, New Windermere Hotel, and many of the newer buildings now under construction or recently finished.

The fact that these cabinets are welded is advertised extensively and given as the reason why they are rigid and durable. "All of the corners are turned and welded with reinforcements," said Mr. G. H. Hess.

The Hess company also makes ventilating systems and in fact a great number of other products upon

order. Their welding department is equipped to handle all kinds of work and is constantly turning out production work for some other concern in or about Chicago and even points farther away. At present they were working on an order of 300 frames. These



One of the Snow-White Steel Cabinets. Welding Plays an Important Part in Its Construction

are made of angle iron and must be welded at the corners. A photographic illustration shows a welder fabricating these corners with the oxy-acetylene torch, The jig upon which he is working is very handy, as he is able to do the work in a comfortable position.

Details of the Welded Cabinet Corner

They also have a similar jig rigged up to act as the ground for their electric arc welding equipment and they are turning out some of these frames by that process. After welding the corners they are ground to a smooth surface and give a very neat appearance.

Just as this article was being written, the Hess company finished an order for 150 ballast boxes. The detailed construction of these boxes is shown in the line drawing. The handles are made of one and one half inch pipe and they project about a foot beyond the box on either end. The box is nearly square in the angles at the bottom and ends. The metal forming the box is rolled over the pipe handles and welded on

Welding Cabinet Frames. Note Piles of Frames in Background. At Left Is a View of the Oxygen Manifolding Room

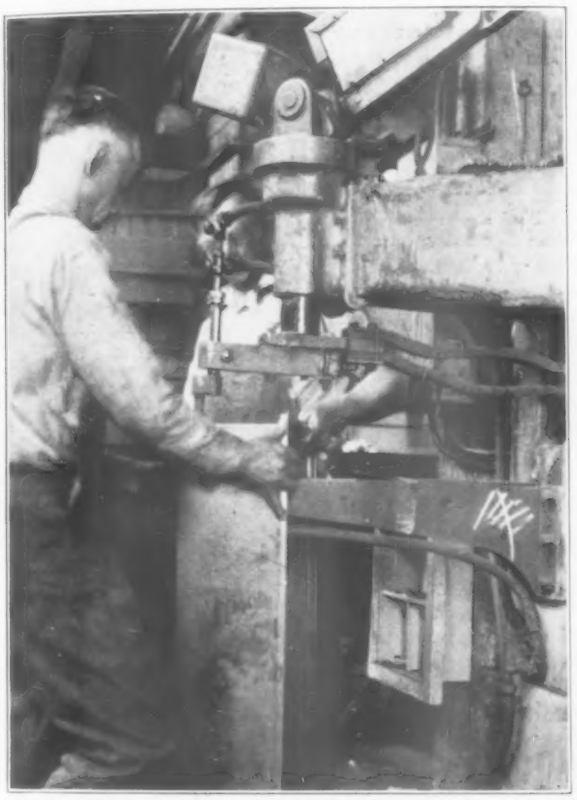
the under side of the pipe. This makes a very permanent job and at the same time a very sightly one and no grinding is required to give it a finished appearance. The box is 38 inches wide and 6 feet long, having a capacity of from 8 to 10 cubic feet of mortar. Similar boxes of more capacity have also been turned out for other contractors, and the Hess company is fast gaining a reputation for doing this type of work.

Welding Special Frames on Outside Order

Another very interesting production job recently completed was on 1300 railway signal boxes. These are all welded by the oxy-acetylene process and must be so carefully fabricated that they are weather-proof and waterproof. Repeat orders indicate that the welding has been well done. The covers are made of sheet steel and are 18 inches high, 24 inches wide and 30 inches long. There is a great deal of welding done on each box for all joints, etc., are welded.

These three examples of production jobs aside from

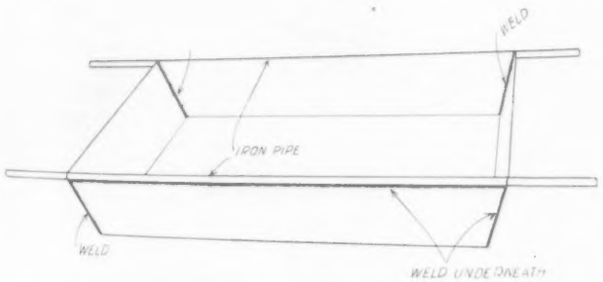
the usual run of the plant work go to show what can be done by a company which is equipped to handle production work, and which is used to handling production work. They are so used to routing large orders through, on the rush, that they can fill orders promptly and make real money by doing it. When an order similar to the ones just described is turned over to the man in charge of welding he immediately gives it to the welders, tells them what is expected



A Spot Welding Operation on Cabinets

of them and then leaves the rest up to them. He does not care how they do the work just so they get it out on time and do the work in a thorough manner.

This method of leaving it up to the men has given them a great deal of pride in their work and they take an interest in it. This is evidenced by the fact that



Ballast Boxes Made to Order for Contractors

when a special order comes through the welders figure out just how they can turn the work out in the shortest length of time and with the least effort. The improvising of the special jigs and holding devices for the work is up to them and there isn't a job turned out that there hasn't been special devices made up specially to handle it. Of course assistance is given them in carrying out their ideas and in this way with perfect cooperation between the men and the plant the work goes on smoothly.

The equipment of the Hess Warming and Ventilating company includes a variety of types of apparatus, each of which finds almost constant use. First, there is the carbide room and the acetylene generating plant with its two 50-pound generators; then there is the oxygen manifolding room which pipes the oxygen from cylinders to the points in the plant where the oxy-acetylene welding is done; next there is the automatic seam welding machine which uses the electric arc process, and right next to this a portable electric arc set. On the next floor are a couple of spot welders and a lot of oxy-acetylene welding outfits and some more electric arc welding equipment. Certainly it is a complete and efficient welding machinery installation of which any sheet metal fabricating plant might well be envious.

CORRECTION

In the paper entitled "High Purity Oxygen Cutting Tests" which was published in the May issue of *The Welding Engineer*, the name of Mr. Geo. L. Walker, of the Air Reduction Sales Company, as one of the authors of this paper was inadvertently omitted. It has also been noted that the last line on page 26 of that issue should read "six inch" instead of five inch, referring to the thickness of the metal being cut.

"WELDING TO ORDER" A FEATURE OF PROVIDENCE EXPOSITION

One Exhibitor Will Demonstrate Process Improvements at Visitors' Requests

"Welding to order" will be one of the features of the Chemical Equipment Exposition, State Armory, Providence, June 22nd-27th, inclusive.

The Association of Chemical Equipment Manufacturers has invited some 15,000 technical and industrial men throughout the country representing the entire range of chemical and chemically-dependent industries, that one of its Providence Exhibitors is prepared to demonstrate the adaptation of a certain type of welding and cutting to a wide range of metals "to order" at Exposition visitors requests. The particular field of welding and cutting processes to be covered by the demonstrations is that of special corrosion-resistant alloys. The demonstrations will insofar as possible indicate the application of these processes to such alloys on a commercial scale.

All that is necessary to insure a particular demonstration, according to the Association, is that its office, 1328 Broadway be informed, some days prior to the Show, of the particular alloy in which any intended visitor is interested.

C. G. M. A. RULES FOR HANDLING CYLINDERS

Rules for the safe handling of compressed gas cylinders have been compiled by the Compressed Gas Manufacturers' Association, 120 West 42nd St., New York City, covering the main safety rules to be observed. These were recently printed in National Safety News and copies of the reprints are offered to members of the Association in quantity at one cent per copy.

The first section of the rules covers the general considerations which apply to all compressed gas cylinders; another section is devoted entirely to the use and storage of oxygen cylinders; another to the use and storage of acetylene cylinders; and fourth, to the use and storage of cylinders containing such gases as Blaugas, Butane, Calorene, Carbo-Hydrogen, Compressed Natural Gas, Hydrogen, Nugas, Pintsch Gas, Propane, Pyrogene, Thermoline, etc. There are also rules covering the cylinders containing carbonic gas, sulphur dioxide, chlorine, and anhydrous ammonia.

Tony, the Incompetent Welder

His Attitude Is Money First and Satisfaction Perhaps—He Learns How to Tell Malleable and How to Braze Fractured Castings

TONY started as a helper in the welding department of a large oil company, but as he did not get an advancement to welder he quit at the end of the first year, and took a job as welder in a little shop, the type all too common with us here.

The little shop was on a side street. The ventilation was good, due to cracks in the roof and side walls. He had a poorly designed welding table, no grinding equipment, and a lime box for cooling.

Before hiring Tony the boss found that he had a little money saved up. (I doubt if otherwise Tony would have been hired.) The boss was tired of holding the bag and soon was able to unload the shop.

During a vacation of mine I happened to need a little brazing done on my machine, and wishing to do it myself I started to look for a welding shop. I had known Tony's former boss, so I dropped in there.

I explained my needs. Says Tony: "All I got is your word for it that you are a welder, and lots of people gimme that bull, figgerin' I will let them use me equipment and get the work cheap.

"Besides, if you can weld, I only have one outfit and I would have to put off my work till you finish, so it will cost you just as much, and my rules is never to let a man use my torch unless I hire him to work for me."

For reasons of my own I wanted to do the work myself, so Tony did not get the job. I had told him that I knew the former boss and Tony was waking up to the fact that he had not bought a gold mine. The equipment was in awful shape; the acetylene regulator had two gauges, one small and one large, the Bordon tube on the line showed 10 pounds with the screw released, and the tank pressure gauge had no glass.

On the oxygen tank a lead burning regulator was hooked up and the gauge had no glass and no hand. The hose had been mended many times, an old torch was hooked up, but a stilson would have been needed to change tips, which were badly oxidized.

All sorts of welding rods were scattered all over the shop, and flux in the original cans, dirty and filled with slag. It would seem to me that as almost every one eats sardines, that the welders would see the utility of the sardine tins for flux cans. They are low and present a large surface, as well as the fact that most flux will absorb moisture and lose it strength, which would all be avoided if this type of tin were used and the amount for each day was put in the tin, then the rest could be tightly covered on the shelf.

While I was looking around a job came back, one of those mop wringers, pressure type, of malleable iron. The boy handed it to Tony, saying, "The boss says to fix this up right away and fix it so that it won't break the first time we start to use it. I got another errand and will be back in about half an hour," and walked out, leaving Tony looking at it.

"You say you are a welder. Now what would you do when you get a piece of cast iron that breaks right by the weld?" "Well," said I, "where I work in the city the boss makes us test each piece of metal to see what type it is, especially as it is always better to have it Vd out at the break.

"As you have no grinding wheel I can tell you a sure test by which one can distinguish between cast iron and malleable." "But this is cast iron. See here is the name and the number cast on the side, and, then, too, cast iron runs fine on this. Besides malleable is used on auto parts and the break ain't like this, and I filed this and it filed like cast iron."

"In this case Tony I do not doubt that it looked like cast iron to you, as, of course, it was white cast iron when cast. You see in making malleable iron they use white cast iron, which takes its name from its color. This color is due to the fact that when the casting is made they do not let it cool slowly, which prevents the carbon in the mixture from separating and forming graphite, as in the case of gray cast iron.

"Bed side rail lugs are of chilled cast iron and are so hard that a file won't touch them. In this, as in white iron, the carbon being held in solution, so to speak, causes the metals to be very hard as well as very brittle.

"In the malleable foundry these castings are placed in annealing pots. Packed all around each casting is low carbon steel shavings, which have been wet with ammonia water to cause them to assume a coating of oxide. The castings are put in a furnace which is brought to red heat and kept so for from three to five days.

"This heating passes from the white iron nearly all the carbon on the surface and slightly below the surface, the depth of the skin of iron being determined by the length of time that the piece was annealed. Also if it is a good piece of metal, the absorption of carbon will have changed the structure, in the case of a break, to fibrous even to the center.

"Take this piece now; it probably was poorly annealed, but notice here on the edge of your weld the blow holes. That, with the type of spark that the metal throws, when molten, is the sure test. As your flame heats a spot red, little pot holes appear and tiny red sparks are thrown off; they are not as profuse or as dazzling white as with steel.

"Due to the pure iron surface and the carbon content of the center, the only way to make malleable hold is to braze it with bronze. In this case you have burned the malleable, and to make a job that will hold you will have to take a hacksaw and cut out on each side of the weld as far as it has been burned. Then cut a piece of mild steel to fit the gap and braze it in, building up some on each end of the malleable. Then it should last for all time."

"Well, mister, I guess you know what you are talking about, and as I remember it did show pot holes and small sparks, but you see I only got six bits for this job and the way you said it should be done would cost more than I got for the job, so I am going to wait till the kid comes back and if his boss wants to pay for a good job, I will braze it."

That's Tony, money first, satisfaction only if paid for the work. As satisfaction of the customer comes first in the shop where I work, I was disgusted and left the shop.

PART TWO

A day or so later I dropped in on Tony to see how he made out with the mop wringer. It still lay in the bench, broken. Tony was working under the rear end of an auto, and from his language I could see things were not going good with him. I squatted down and saw that he was trying to braze a brake arm or anchor. Trying is right, there were enough splashes of bronze splattered on the floor to braze two arms.

"Bum piece of malleable Tony?" "I'll say so, I got the upper part stuck but the bronze won't stick now." There was a ridge on the center for strength, the upper part making a dam which he had filled with bronze.

"The first of the week I will be back at my job in the city, and I would appreciate it if you would let me finish the job because it will help to get my hand in again. Besides we have many of that sort over there and I am used to running bronze up hill."

"Well mister I thot about what you said about malleable and maybe you do know more about this than I do, and this is promised in about an hour so hop to it."

"First of all you din't grind out any of the metal." "Couldn't, it was only cracked." "But in all cases you should see that all the grease and dirt are cleaned from the spot that you are going to work so if you have a brush I will use it and while you are getting it I will get the torch ready."

As I said before, the regulators were in rotten shape as well as the tips, and with strange equipment it was going to be some job, he had a No. 7 tip in, but on looking over his tips I found that the next smaller size was 5, so I would have to use what was in the torch.

Going over to the tanks I released the regulator screws and then set the acetylene pressure with the torch cock open to 20 lbs. and then opening the oxygen torch valve and placing the tip so that the gas would play on my cheek screwed in until a good pressure came (there was no hand on the oxygen dial).

"Now if you have cleaned the arm we will start, but first get a pail of water and at any time if the brake drum, lining or spokes begin to smoke drip a little water on them. First I will go over your work and smooth it up and the radiated heat will get the rest hot so that I can go right ahead.

"In all brazing one must take plenty of time to get the parts to a red heat before trying to add any metal. You did very well on this upper part but the tip is too big, so we will have to cut down the heat a bit otherwise it will be hard to keep the metal from getting too hot. If, however, I merely close the cocks a bit there is danger of the torch popping so I will decrease the oxygen cock slightly and open the acetylene cock till I have a feather flame of acetylene that extends about a half an inch from the tip; see!

"Notice how rough the malleable seems. That is because in trying to make the bronze stick you burnt the metal, that means that I will have to do much the same, as if the metal were cast iron. When the metal is red hot we add flux with the filler rod and not letting the flame touch the rod but keep it moving close around in circles, rub off the flux on the work and if any of the bronze adheres to the metal so much the better. Our object is to force a thin skin of bronze to stick to the metal. You notice that even if the feather flame touches the bronze, that makes no trouble but if one tried to use this type of flame in welding steel the molten steel would absorb some of the carbon and would foam up, and some times where an uneven skin don't matter this is a quick way to case harden.

"You will notice that the borax that we are using seems to boil up and only part of it adheres to the hot metal. This flux of yours is mostly commercial borax, which has five or ten molecules of water of crystallization, which when heated, swells up into a porous mass. This is due to the water of crystallization being driven out by heat, the borax left on the metal will as we add more heat to it, melt into a glassy mass.

"That was one reason that it was so hard for you to make the bronze stick in the vertical part of the arm. Your flame hit almost directly on the borax which swelled up and most of it fell off, and so little remained on the work that the skin was not heavy enough to prevent oxidization, which with the property of being able to dissolve the oxide and other impurities on the part being brazed is the duty of the borax.

"Now that a thin skin of bronze is adhering to this part we will build up a bit. In building up on the vertical you must be careful never to let the flame stay on the bronze for more than an instant. By keeping the flame moving in circles, the rod as the center and keeping a rubbing movement on the rod all the time, (of course one must keep adding flux pretty often), the reflected heat of the flame and the heat of the work will keep melting some of the rod, and in building up the pressure of the flame is also used.

"We use the flash system. By that I mean for an instant the flame is held on the rod and as soon as a drop of bronze is molten we use the pressure of the flame to wash it onto the work. In this way all the bronze is placed just where we want it and very little is lost. You will notice how if I let the heat stay too long in one spot how the bronze balls up. This is cohesion, the attraction that holds the molecules of the same metal together, so as to form larger bodies. With out it in over head welding, we couldn't make it stick.

"Cast iron has poor cohesion due to the high carbon content, and it almost impossible to make a good job in overhead welding with cast iron. Bronze, steel and aluminum (if held at the granular stage) have enough cohesion to make it easy to do over head welding, and as this part is now built up heavy enough I will do some real over head brazing on the bottom of this arm. The only difference in over head brazing from vertical is that one must take care in flashing the flame, that the flame is always moving and, as in aluminum, to use that granular rather than the fluid state, as in horizontal brazing. Notice that while it wants to ball up, the movement of the torch holds it where I wish it to stay.

"Well, Tony, that's that and while you were so interested in the work that you almost let some of the parts get too hot, of course if you had done it alone I guess the final result would have been about the same. However, you saw how it was done and with it in mind, the next job should be easy. Remember that knowledge helps greatly, but experience is the greatest teacher, if one will try to remember all his failures and how they came about so that it may never happen the second time. In fact experience is nothing more than the memory of the methods by which work was done, whether successful or not.

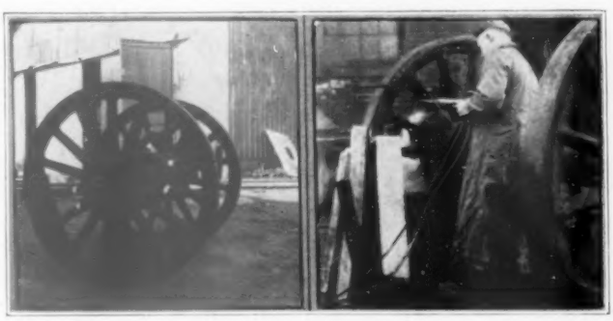
"If the job was a success try to keep in mind the way it was done, if it was faulty, try to remember where the mistake lay that it can be avoided in a like job."

"Say mister what's your name? Henderson; well Henderson any time you get any time to spare you can come in and help me with my work; you seem to know quite a bit about welding, and I won't charge you anything for using my equipment."

Was that praise or did Tony think he was going to get some thing for nothing, what would you say?

REPAIR OF LOCOMOTIVE WHEEL

An interesting locomotive wheel repair was recently reported by Mr. H. E. Winkelman, of the Purox Co., Cleveland Branch. He was called in when there was a question as to how to proceed with the repair of two five-foot drive wheels on a passenger locomotive which makes five round trips daily on a branch line. The right wheel had five spokes broken. One of these was clean break and the other did not extend all the way through the spokes. The method of handling this was to make a cut through



Left—Arrow Points to Welds in Spokes. Right—The Job Under Way.

the rim, weld the broken spoke with cast iron and braze the four which were cracked only part of the way through. The left wheel, which had one spoke broken, was welded with cast iron. The job required 670 cubic feet of oxygen, 580 cubic feet of acetylene, 35 pounds of cast iron and 25 pounds of bronze. The actual welding time was eight hours.

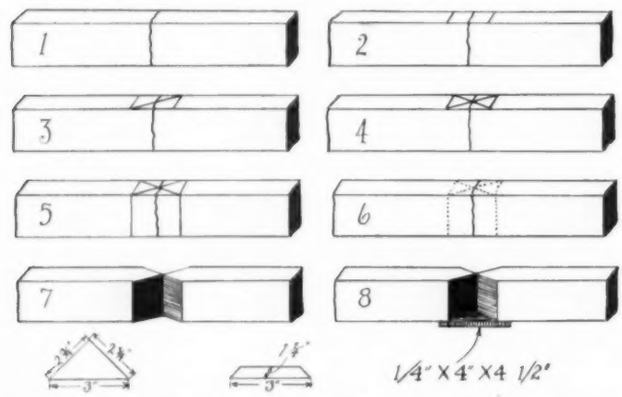
Electric Welding Locomotive Frames

Early History of Frame Welding—Troubles of Locomotive Builders—Use of Plate Inserts in Frame Welding With the Arc

By R. P. Palmer

THE electric welder started by asking our host if he would permit him to commence his story at the beginning of his welding experience. The host agreed providing that he did not go deep in details on other than welding frames.

The electric welder began as follows: "About 1906, I was employed by one of the leading locomotive builders, and welding by the electric method was not then a common practice. In fact, I cannot recall ever hearing about electric welding at that time. Throughout this large locomotive plant there was considerable trouble experienced on account of pulleys broken on line shafts. As there were five machines direct driven there were many cast pulleys of different sizes and designs, therefore, to carry a stock of spare pulleys for use in emergency was out of the question, but to shut down a machine and wait to have a new pulley cast and machined was also out of the question, for delays are costly in such a plant.



Method of Preparing Frame for Welding by the Electric Arc Process.

"The first thing we tried was brazing, both in the open forge and by oil torch. When we brazed this class of work, we used saltpetre for flux, and although the job was not so fine to look at, it usually served the purpose until a new casting was made.

"At a later date I had my first experience in electric welding. We used a water rheostat and as everyone thought it correct to connect the positive line to the carbon electrode, we did so, and the negative was connected to the job. We used this machine for welding broken pulleys instead of brazing and did some very good jobs on cast iron. Do not misunderstand me, I don't mean that the work could be compared with the present day work but at that time I believe it was as good as the average. Of course, we reinforced a lot and the weld was not machineable. We used borax for flux.

"In 1913 a certain railroad company ordered fifty (50) locomotives and specified that each course be welded, as well as riveted, because electric welding was then used on a lot of work. The builders decided to electric weld these courses. A motor generator outfit was procured from a manufacturer. It had a high reputation for welding and at that time, an experienced operator was furnished by the machine manufacturer.

"After many trials, it was finally given up and the courses were welded by the blacksmiths. A large hole was dug in the floor of the boilershop and the course was placed in it. A portable forge and anvil was run back and forth through the course on a small track and in this way the job was finally completed.

"I was employed by another locomotive company in 1915 and they had an order that specified welded flues. They did not have a welding machine, but ordered one and hired a 'so-called' expert; but with no success. The flues were never welded. This machine also used the positive to the electrode and the negative to the job.

"At a later date I was working in an industrial plant that had been making munitions, but at the close of the war they started repairing locomotives. This plant had two modern welding outfits, the positive line being connected to the job, and the negative to the electrode. Very good work was done on flues, side sheets, and door sheets with these machines.

"While they had a large number of locomotives to repair, they received an order for fifteen new steel cabs. As the seams had to be electric welded and the two portable welding sets were busy night and day on repair work, also the profits on fifteen new cabs were not sufficient to warrant the purchase of another new welding machine, the company decided to borrow two alternating current welding transformers from a nearby foundry, where they used them for filling holes in casting, using carbon electrodes.

"However, there were short circuits in the secondary of the transformers due to the metal electrodes sticking to the parent metal. The sticking caused one of the transformers to burn out, before the first seam was complete. These machines were only intended for carbon electrodes, so it cost $350.00 to rewind the coils. The electrician in charge secured a few boxes of old grids that had been scrapped and he made a rheostat which was connected to the direct current power line, 220 volts. When using this machine all work must be insulated from earth ground but as the work was being done on a dry concrete floor, this was satisfactory. The negative line was run to the rheostat, from rheostat to electrode, and the positive lead ran directly to the job. A very satisfactory weld was secured in this way and at low cost."

The host interrupted, "Pardon me," he said, "but I thought this was a discussion of frame welding by the different processes and so far, you have not mentioned a frame."

The electric welder begged for just a little more time and promised he would soon be on the subject of frame welding. He stated that electric welding is energy, transformed into heat, to melt metal to make a weld. The energy is supplied by a suitable generator to which the positive and negative lines are connected. "A suitable device is attached to the end of the welding line, negative, and the ground line or positive is attached to the job. Now, let us place an electrode in the holder and touch the job with the end of the electrode, thus making a connection and starting the electricity in action. We now draw the electrode away from the job a distance of 1/8 inch to 5/32 inch without breaking the connection, the current continuing to pass between the job and rod. You may wonder what supports the current between the job and electrode. Several authorities claim the air supports or conducts the current across this space just the same as the air supports a wireless or radio current. As the current passes across the arc it carries with it minute drops or particles of molten metal. At the point where the current enters the job the metal is molten. The tiny drops of molten metal unite with the molten metal on the job and thereby form a solid piece of metal.

"I might say at this time that a good authority claims that

a generator does not make electricity as many people believe, but it just puts into action the electricity that exists at all time in the air. This could be compared to a water pump which forced the water to some certain place where the water was changed to a steam, passing into the air as vapor and returned to earth in the form of rain to be forced through the pump again.

"We use a 5/32-inch electrode for frame welding and the same is flux-coated because we find by using the ammeter at the job, that a flux-coated rod uses slightly less juice than a bare rod. The flux also burns and throws off a gas that prevents the exodization of the particles passing from the rod to job. The flux forms a coating on the finished weld that prevents oxidization.

"We use a 32 to 35 volts at the arc and not over 150 amps. with 5/32-inch electrode, as any more amperage will have a tendency to burn the life out of the metal. Now we will start on the actual welding of a locomotive frame.

"First, tram your frame just the same as for thermot, and remove all parts of the locomotive that might interfere with the welding. We next mark the frame for cutting. Suppose the break occurs in the top rail of the frame. We draw two lines on the frame, parallel with the break and 1½ inches on each side. Draw two similar lines inside and outside the frame and draw a line from the line in front of the break, outside of frame to the line, back of break inside of frame. Draw another line to opposite lines. Now you see that these lines cross at a point exactly in the center of the frame and center of break.

"We then center punch all lines and sever with cutting torch. You will find that you have a double V, 3 inches wide and 2 inches deep. We next go to the boiler shop and cut thirty-two pieces ¼-inch plate 2¾x2¾x3. We also cut a piece ¼x4x4½. We now go to the emery wheel and grind the two short sides to bevel of 45 degrees, grinding both edges on the same side of the plate.

"The ¼x4x4½-inch piece we place under the V on the bottom side of frame, allowing ¼ inch to extend out on each side of frame and extend ½ inch on each side of V. After welding the piece of ¼x4x4½-inch on the bottom side of the frame, we take one of the 2¾x2¾x3-inch pieces and place it in the V, allowing it to rest on the 4x4½-inch, the beveled side of the small plates are up, thus making the sharp edge of the plates at the bottom of small V. Then weld the small plates to the frame, welding both sides, being careful not to make too large a bead as it will interfere with the placing of the next plate."

"We usually work two men, one on the outside and one on the inside of frame. Care should be taken to get one side of the frame higher than the other. I mean by this that the inside welder should be welding his fourth plate while the outside welder is welding his same number. After welding the last or top plate, we start again at the bottom and weld the 4-inch piece to frame on all four sides. We now weld a horizontal bead the entire length of bottom (4-inch) plate thus allowing an overlap of ½ inch on each side of the V. Place another bead beside and above the first and so on until the top is reached, and the top is covered in the same manner.

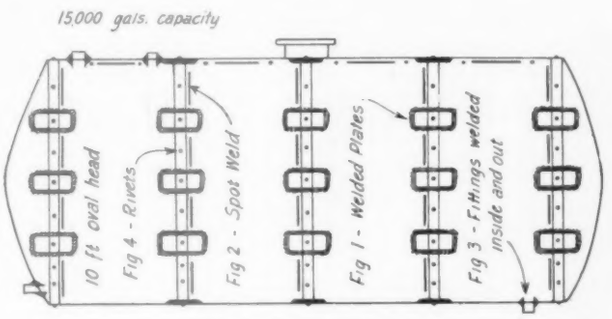
"I forgot to mention that we spread this frame 3/16 inch. A frame welded in this way will contract very little, sometimes as little as 1/16 inch, but it is better to have a slight pressure than a pull on the finished weld.

"We sometimes weld a frame in almost the same manner as by oxy-acetylene. We V both sides 25 degrees and start at the bottom to deposit the metal, filling the entire V with added metal. For this class of work we use a heavier electrode ¼ inch prepared and we do not use the ordinary welding machine, but use one similar to the one used for welding cabs (mentioned previously). This machine is very simple and also very serviceable. The most objectionable feature is that all work must be insulated from earth ground, which is sometimes difficult unless a shop is equipped with large overhead cranes. Care must be taken that the operator does not get shocked, as the current is high enough to cause death..

SPOT WELDING TANKS

By F. D. Palmer

For the past two years I have been welding in a tank shop and have made many tests of the strongest and cheapest ways of building tanks. I have found that spot welding plates every twenty-four to thirty-six inches on inside of seams (shown as Fig. 1) with spot weld from eight to twelve inches long between plates shown (as Fig. 2) answers the purpose of rivets. If this tank should be riveted before it was welded the weld would not have the proper expansion and contraction, for when the weld cools either the weld or rivets will be left with a strain. This in many cases is the cause of failures. If the tank should be welded before it is riveted, when the rivets are driven, the vibration will in many cases have a tendency to weaken the weld. If the tank is put together by means of spot welds instead of bolts or rivets, as shown in the sketch, the result will be to strengthen instead of weakening the tank. All fittings should be welded both inside and out, shown (as Fig. 3).



Spot Welds Replace Rivets

These plates used as shown in Fig. 1 were four inches wide by eight inches long, made of five-sixteenths tank steel.

I have found that this method makes tank building cheaper and better.

BOILERMAKERS VOTE ON STANDARDS FOR WELDING

The 16th Annual Convention of the Master Boiler Makers Association which was held at the Hotel Sherman, Chicago, during the week of May 19th, is reported to have been the largest and best attended convention in the history of the Association. The total registration reached 711. The welding industry was well represented in the list of members and exhibitors by the following companies, Air Reduction Sales Company, New York, Chicago Eye Shield Company, Chicago, Oxweld Railroad Service Company, Chicago, Thompson Electric Welding Company, Lynn, Mass., Torchweld Equipment Company of Chicago and *The Welding Engineer*, Chicago.

One of the important topics of the convention was that of adopting a code of rules to govern autogenous welding on steam pressure boilers. A committee of the Association has been working for a long while to prepare a code of standards which would be satisfactory to the Association and in the course of this work has conducted some very interesting tests with the different processes. The proposed code drawn up by the committee covered a big range of work and it developed in discussion that there were many differences of opinion both on the advisability of adopting certain of the standards and on the interpretation of some of them. Therefore, the entire code was not adopted, but several paragraphs were stricken out temporarily and other paragraphs were referred back to a special committee for further action. Altogether it was considered that the committee had done an excellent piece of work in preparing the proposed code and as the work is carried on further the benefit of standardized procedure will be undoubtedly welcomed by all those who are interested in the subject of boiler construction and repair.

Extravagance of "Economical" Welding

Welding Cannot Succeed Unless Welders Are Interested in Their Work—Good Wages Prove to Be a Sound Investment

By El Soldando

I ENTERED the welding field via a U. S. Shipping Board School where it was impressed upon us that the human element in welding was the all important factor. Where the machine and materials were of the very best, a poor weld was possible. Also, a first class welder could do good work even when confronted with inferior equipment.

We were warned that welding could not succeed if the welders themselves did not go about their work conscientiously—doing their very best all the time. Many men went through this particular school, and I feel sure that they were all made to realize that, as our instructor put it at the time—"you cannot point a torch in the general direction of the article to be welded, go day-dreaming and wake up in half an hour to find a water tight job." This result would require nothing short of a man's undivided attention.

And so we made our way to beautiful (?) Newark Bay,—Welders, a torch in one hand and a mask in the other and our conscience always on tap. Once away from the guidance of instructors and left to our own resources, many of us subscribed to such technical journals as touched upon the subject of welding. Here again we ran into the "human element" propaganda. Even today it is difficult to pick up a welding journal that does not make some reference to this "conscientious" welding. And now after seven (7) successful years, where are we, the welders at? During these past seven years welding has increased by leaps and bounds. Welding shops have sprung up everywhere and their owners have done very well financially.

But, what of the welders who if we are to believe this old theory, have by their conscientious efforts, made this possible? They are earning less today than when they started. There are the few who became foremen but they are in a pitiful minority.

Of course this is also true of other trades, but how and why has this been brought about in a trade where the employer must depend to such a great extent upon the individual? The reason is principally a desire on the part of employers to reduce expenses.

While in California I spoke of this to an employer of several welders, but he could not see how this materially effected the welding industry. It was but the survival of the strongest. They —the employers were the stronger and could impose such terms as they pleased. He did not see how he was under any obligations to the welders. They were doing the work but he was paying them. If the pay was unfair, it was but the natural outcome of things in the industrial world. And so there may be many others who view the situation like this employer who could not see how low wages could effect the welding industry.

The man in business wants the maximum in results for the minimum expenditure of money. The welders could take it or leave it.

The business was no longer in the experimental stage.

It was a real up and going business with the employer at the wheel, driving as they pleased and their motto is, "more feet per hour."

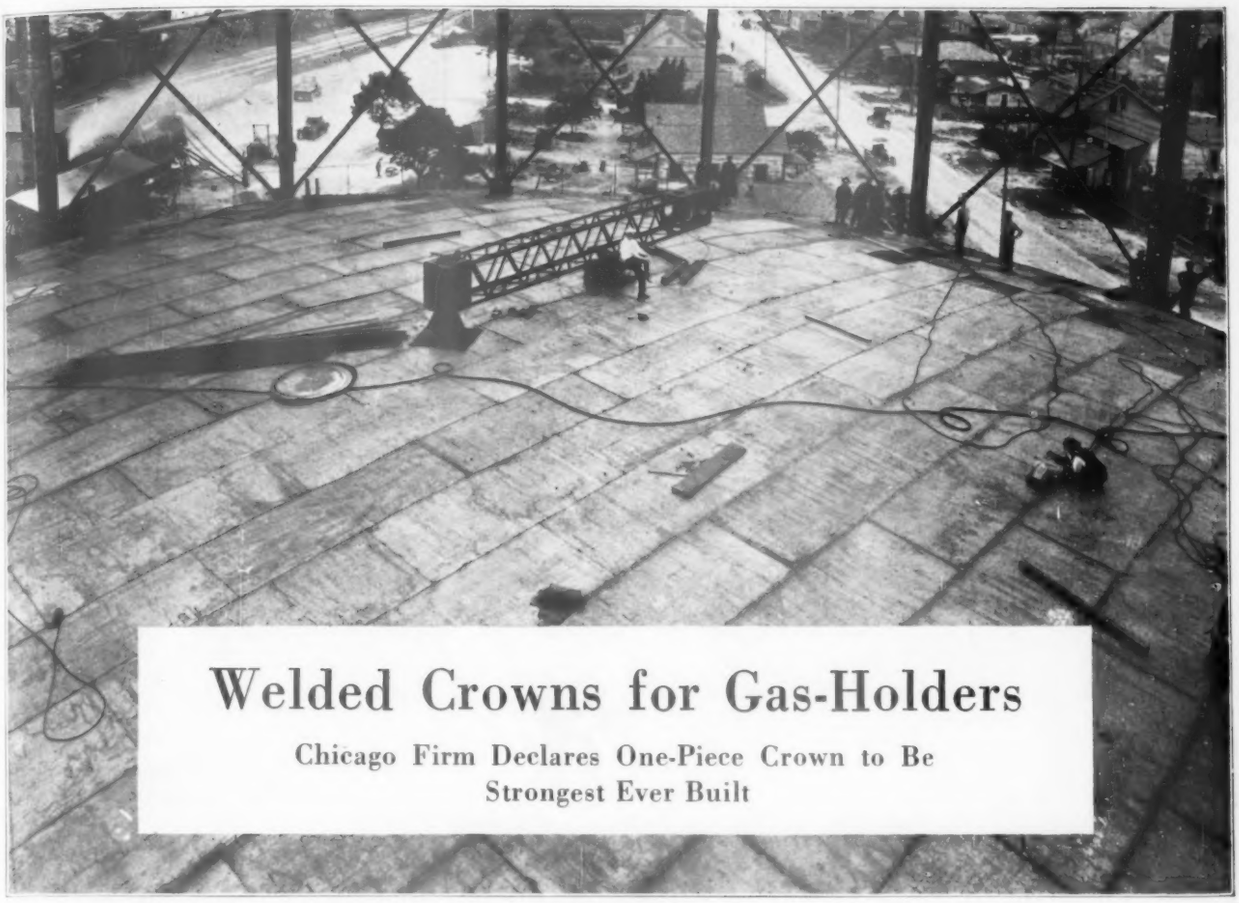
However that is not the closing scene. It has been my experience from coast to coast that a reaction has set in among the welders. As a foreman and a welder, I have watched the effect of this reaction upon welding and have seen competent welders resign their positions because of the cuts in wages and return to their former trades, disgusted with welding. The average foremen were and still are boiler-makers, who know nothing about welding. The loss of a good welder did not worry them. The market was full of welders. "Why," they would say, "there is nothing to this welding," and they would bring out a copy of some catalog which showed how simple it was to weld. The sort of catalogs which usually showed in their statistics on job costs that the welders received about 60 cents per hour. Then they would hire the first man to apply and pay him a smaller wage than his predecessor, to show that they were running their department economically. The usual result was, poor welds that failed in a short time causing the boat to quickly tie up again for repairs, and at considerable loss to itself and the prestige of welding.

There were other welders who in way of retaliation made poor welds that they hoped would break down. Then the piece-work and bonus system came along and with it the few remaining good welders fell victims to "more production." They could no longer afford to spend time on a job. They were not being paid to think.

I worked for a company that supplied casings and tanks to the oil fields. The owner of this firm we will call Mr. S. He was a gentleman for whom it was a real pleasure to work. Mr. S. was misled into adapting a system of production that almost wiped out his casing business.

This man was the originator of an arc-welded oil-well casing. He had great hopes for it and found a good practical welder who hired a staff of welders, created a department, and proceeded with the production of these casings. They instantly became a success, and in a short time this department was running a 24 hour day. In a few months the owner, highly pleased, raised the rate of the welders. All was well. About this time a foreman in another department who did not know the difference between a welding machine and a concrete mixer, informed the owner that he could run the welding deparement in conjunction with his own and much cheaper than it was being run. A welding school had been started in town, and he would hire these students as they graduated, at half the salary of the present welders. It sounded good, and in a short time the welding foreman was forced out and the department was handed over to this economic expert, who promptly replaced the welders with students. Again all was well. Casing was now being made at a saving of one cent per foot, or a saving of $10.00 on every string of 1,000 feet. Things went well until these casings were put into the ground, when they pulled apart as though they had been glued rather than welded. These breaks caused a great loss both in time and money to the firm doing the drilling and a far greater loss to the firm that made the casing. Contracts were cancelled. The oil companies would not touch welded casing. Production at the plant ceased. However Mr. S. had faith in welding. He decided to continue where many would have stopped. He again called in a first-class welder who began to organize a new department. The welders now receive a higher rate of wages than they enjoyed before the economical adventure, and in a few months the casings were again a success.

This is but one example, but I could state many. Let us hope that it will be sufficient to bring out my point that economy in welding may be necessary along certain lines, but it is both a mistake and an injustice when applied to the welder's salary. And, lastly, a danger to the idea of welding as a business.



Welded Crowns for Gas-Holders

Chicago Firm Declares One-Piece Crown to Be Strongest Ever Built

WELDED crowns and bottoms are featured by the Chicago Bridge and Iron Works of Chicago, Illinois, as important and valuable improvements which individualize Horton Gas Holders, one of the leading specialties in their line of construction operation. This company has done considerable pioneering work in the application of welding to large containers of this type and gas men who have inspected the crown on the million cubic foot gas holder at Miama, Florida, constructed for the Electric Bond and Share Company, are said to have been unanimous in declaring it is the best crown they have ever seen.

A gas holder is an apparatus for the storage of gas. The amount of gas used by the consumers has a wide variation over a 24 hour period. The output of gas during the hour of maximum consumption is ten times that during the hour of minimum demand and it is by means of gas holders that this wide variation of output is provided for. Without the gas holder it would be necessary for the gas companies to have a very large investment in production equipment which would be required one hour a day or one hour a year only, for such equipment without a holder must provide for the maximum hour which may occur only once a year. The cost of gas production equipment per unit is considerably more than gas storage equipment per unit so it is evident that storage equipment represents a small outlay for peak consumption than does production equipment.

In addition to functioning for the storage of gas, gas holders are also used for the distribution of gas. The weight of a gas holder fully inflated or only partly inflated exercises a pressure upon the gas and such pressure is used to force the gas into the distribution system. A holder fully inflated with five million feet of gas in it exerts a pressure of approximately one-half pound per square inch. This pressure varies according to the heighth of the holder. That is, as the holder falls and each section is "landed," the weight of metal suspended becomes less, therefore the pressure exerted upon the gas contained is less. This principle of the pressure exerted by the holder is taken advantage of by all gas companies as far as possible in the distribution of gas. In the larger cities it is usually the case that the holder pressure is not sufficient to deliver the required volume of gas and in that event boosters are installed to draw the gas from the holder and boost it up to the required pressure. But, often under such conditions the holder pressure can be utilized as much as possible by distributing the gas through a separate outlet connection and to the territory adjacent to the holder where the holder pressure is sufficient.

A gas holder consists of a tank for the storage of water, one or more lifts arranged to telescope one into the other as they rise and fall, and a suitable frame work made up of a number of columns placed around the holders at a distance from 15 to 30 feet apart. The columns are adequately braced together by horizontal girders and diagonal ties. The girders are built up from steel sections while the ties on small holders are rods and on large holders angles or channels. The inside of columns form a path for the wheels on the goose necks. This engagement provides for a guide of the rise and fall of the lifts and also

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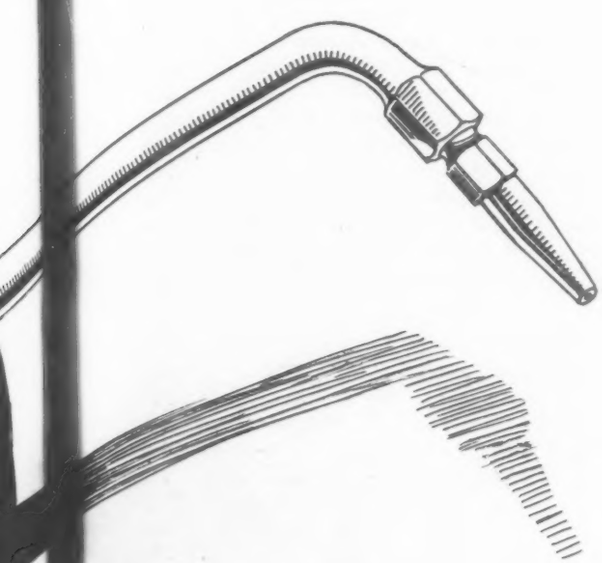

No matter how short the time is that you keep the torch burning between jobs, this automatic torch will soon pay for itself in saving the gas you are now wasting.

Once regulated, the Rego Automatic is always ready. When you pick it up, it is set to go. You can start the job immediately. No time lost adjusting the flame.

The Rego Automatic Torch comes in two sizes: the Rego GMA—large size, and the Rego GSA—small size. Like all Rego equipment, this torch is constructed to give real service and satisfaction. You'll like it. It will cut down your gas bills and help you do more work."

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Dallas, Texas	Southwest Welding Supply Co.	502 N. Harwood St.
St. Paul, Minn.	St. Paul Welding & Mfg. Company	174 W. Third St.
Los Angeles, Cal.	Courtney-Eck Company	441 Douglas Bldg.
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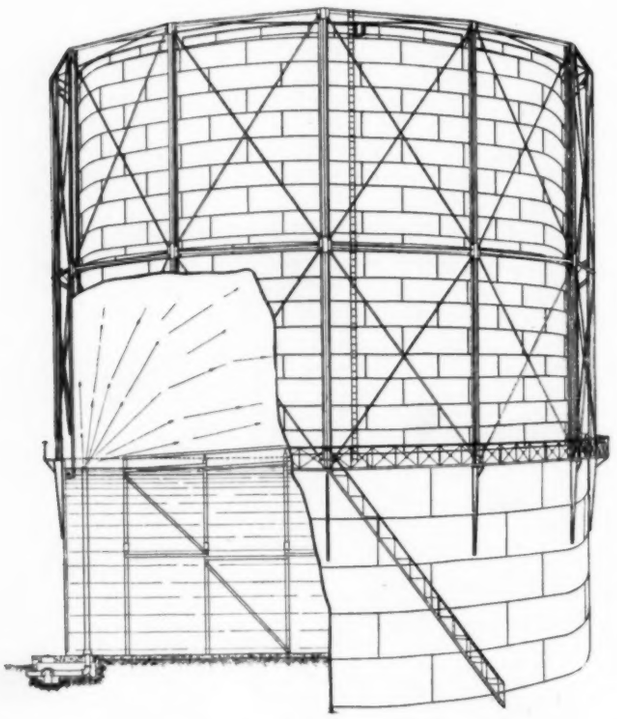
prevents a rotating movement. In the past it was customary to erect massive cast iron columns but this design has almost been entirely superseded by lighter columns constructed from mild steel sections.

The design of a gas holder presents many problems which must be solved. The holder must resist the pressure exerted by strongest winds; it must be so designed to carry the additional weight due to heavy snows and the tank walls must be of sufficient thickness to resist the pressure of the water it contains. In climates having temperatures below freezing provision must be made to prevent the water in the tank and cups from freezing.



Details for Gas-Holder Construction.

The welded crowns have all the advantages of the welded roofs which the Chicago Bridge and Iron Works introduced to the oil industry several years ago. The plates are welded so completely and so securely that they give the effect of one immense plate. This one plate effect gives unusual strength to the crown and eliminates the possibility of leaks developing.

A bulletin recently issued by the company states, "We know just what we can expect of the Miami crown or of any Hortonwelded crown we put on your gas holders. For the last few years we have conducted original tests on actual field welded specimens. Guided by the results of these tests we have developed the best weld for each plate thickness and plate position. The tests and actual field welding have shown us exactly how we may depend on welding. We recommend welded bottoms and crowns as superior to riveted work.

"Hortonwelding in the field as well as our test specimens have taught us that the most essential requirement of welding is the ability of the contractor to do it, and stand behind it. Hortonwelding is electric arc welding, plus the integrity and responsibility of the organization which performs it.

"In the crown the $\frac{3}{16}$ inch welded plates provide a safe crown. The gases which might seriously endanger a lighter, riveted crown, will find no encouragement in Horton Holders."

NEW G-E ENGINE DRIVEN ARC WELDER

A new engine driven welding set has recently been added to the General Electric line of welding equipment. This outfit consists of a standard WD-12 welding generator driven by a Buda engine, all mounted on wooden skids to facilitate moving from place to place.

The engine is a Buda model WTU, especially designed for heavy duty. It is a four cylinder, four cycle machine of the "L" head type, with 3¾-inch bore and 5⅛-inch stroke. The S. A. E. rating is 22.5 horsepower, and at 1400 r.p.m. the actual brake horsepower is 33.

The new outfit is being marketed complete with all accessories and ready for use. This unit should be of value in locomotive repair work at roundhouses; in the construction of pipe lines and tanks and in repairs in oil fields; in ship repairs, either at the dock or by welding barge, or in any industrial plant or on any construction job where electric power is not available.

WELDER ON HUGE CASTINGS HAS TROUBLES —

One of the largest repairs ever attempted by the oxy-acetylene process in Australia was a cracked turbine casting weighing 7¼ tons. The castings was the top half of an 8,000 horsepower steam turbine. The fracture extended for a distance of about twelve inches from the front end and the thickness varied from two to seven inches. After the crack was bevelled for welding it took eight hours to preheat it, and the welding itself required six and a half hours. Asbestos and galvanized iron were used to protect the operator from the heat and carbon paste was used to support the molten metal and protect the shape of the casting in the vicinity of the weld. After welding, the casting was reheated and allowed to cool slowly. Then their troubles began.

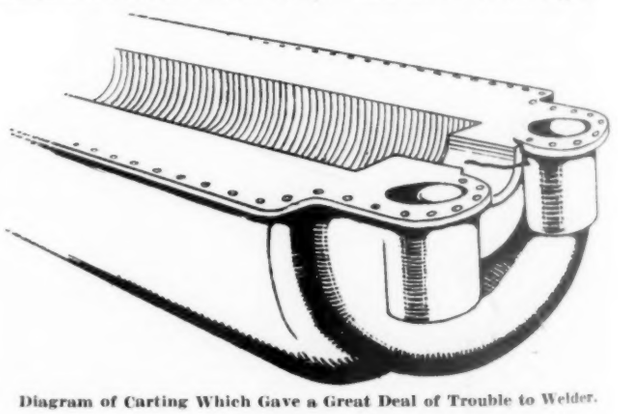


Diagram of Carting Which Gave a Great Deal of Trouble to Welder.

While the casting was cooling a concrete support, upon which the front part was resting, began to crumble. There was an overhead crane handy which was fortunately brought into service just in time to save it from dropping ten feet into the water at the base of the support. Then it was found that this enormous mass of metal hanging half over in a nearly plastic condition had serious consequences. The temporary furnace was scattered and a piece carefully placed to guard the diaphragm from closing flew out, and the front half of the casting was put to such a great strain that it twisted and warped. It took fifteen days and four successive heatings to bring it back to its original shape. Throughout all this long treatment the weld stood up perfectly and is now reported as good as new after being in operation for twelve months.

Welding Cylinder Blocks

Severe Winters Cause Multitude of Cracked Blocks—Variety of Methods Employed in Making Repairs. Each Has Its Good Points

By R. K. Randall*

THERE is a formula well known to most welders. It goes like this: "One zero night = many cracked cylinder blocks."

The last winter was, I believe, a fairly severe one; I know that in Cleveland the weather produced cracked cylinder blocks from January 1st up to the middle of March.

Knowing that blocks were being welded all over Cleveland I devoted quite a little time to observing the methods employed by various shops in repairing these breaks.

Mechanical Method

One of the interesting things I saw was a block cracked about seven inches. The crack was on the side of the block. The "welder" started at one end of the crack and drilled a $\frac{13}{64}$" hole and then tapped it out to ¼". He then ran in a piece of round cast iron welding rod previously threaded to ¼". After running in his "stud," which he set with paint, it was sawed off flush with the block and another hole drilled, care being taken to allow the second hole to slightly overlap the first plug. Then this hole was tapped and another plug inserted. This process was kept up till the entire crack was filled, and I want to say that when the job was filed off and painted no one could tell where the crack had been. I had seen the same idea used on small holes in cast iron valves where bad sand holes had developed and the foundry had fixed them up by drilling and tapping and then inserting a threaded plug.

Several firms were using different kinds of "fix." These jobs were Vee'd out, cleaned and then the "fix" applied. Some of the shops had a good old-fashioned brick furnace built and the fire going and were pre-heating the blocks and then welding with the oxy-acetylene flame.

All Types of Arc Welding Used

The shops that interested me the most however, were the shops where electric welding of blocks was being done. I found that there were three different types of machines being used. The regular D. C., the regular A. C., and some of the intermittent type. It was interesting to talk with owners and to notice how much real confidence each had in their own particular machine. The arguments each had for their type of machine would make a good salesmanship course for electric welding sales departments.

The wire or "electrode" phase apparently had been given considerable attention and the selection ran from drill rod to straight "Monel" drawn wire. The best results I believe were obtained from the nickel wires, although low carbon electrodes gave very good results.

Next in order came the "dope." Shellac, paint, sal-ammoniac, sulphur and liquid X all were used, each shop apparently having decided upon which "dope" was the best.

Results in Various Shops

I am going to try and give a short summary of the results as seen by myself and the summary is based on the results I saw on some fifty cylinder blocks and heads in various shops.

The first thing I considered was the customer's attitude and position. I was surprised at first to discover that the average customer asked to have his job done with electric welding while the garages wanted them done with acetylene. The answer is easy to understand. The customer wanted to save the expense of taking his motor down and the garage wanted that extra work. Who was in the right?

The Customer's Point of View

Out of curiosity I went to a large garage and explained I had a "Buick" six with a cracked cylinder block and asked them what I could do about it. They told me to bring in the car and they would weld it for me. I inquired whether by "gas or electric" and they said "gas." The price to me was $60, (this included tearing down, welding and reassembling). I then inquired at a shop where the advertisement read, "cylinder blocks welded without pre-heating" and found that they would do my job for $22.00 without me having to tear my motor down, job guaranteed. Conclusion one, is, that for economy's sake, electric welding is the cheaper way.

Now as to the quality of the job. No one who is familiar with welding will deny that the acetylene welds on cast iron blocks are superior in quality to electric. Where acetylene is used there is no need for "dope." Conclusion two, then is, that for an honest and truly job, the acetylene weld is superior on a block to any electric weld from a standpoint of 100% quality.

Electric Welding Procedure

To make an electric weld on a cylinder block the procedure was to "Vee" out the crack then run the head of welding into the crack. The welds were made in short sections to keep the work as cool as possible. After the weld was in it was ground flush. I did not see one out of the blocks I inspected that did not have leaks. In some cases they were worse than others but none of them were what could be called tight. The various dopes were then applied, some on the inside and some on the outside. By the time the customer came for his car the welds were absolutely tight. Are welding shops justified in making a weld that has to be doped in order to make a tight job? My third conclusion is "yes they are." The leaks in an electric weld are nothing more than shrinkage cracks caused by the contraction of the molten steel being deposited on unexpanded cold cast iron. They do undoubtedly detract from the strength of a weld but let's admit the weld is only 50% efficient. Taking the tensile strength of cast iron as against that of steel and we find that the 50% efficient steel weld is as strong as the cast iron at least. As for stopping the small leaks with dope, it is a well known fact that the inside of a cylinder block or head very quickly forms over with a seal so hard and solid that it will in a short time "rust tight" any small holes that may be present. My fourth conclusion is that if a customer could be made to understand this, no dope would be necessary, for the weld, if made with any degree of skill, would "dry" up of its own accord in a few days. To be sure, the method I spoke of earlier is not without its merits, namely, that of inserting plugs; and is well worth trying if the crack is a small one.

Motorists Generally Satisfied

In conclusion I would like to say that regardless of the methods used I do not know of any of the blocks that were turned back to customers who were not satisfied and in this way the welding trade performed a service to the motor public in the country this last winter that if actual figures could be obtained it would show an economic saving to the people of an enormous figure.

Director, Welding School, Cleveland Y. M. C. A. School of Technology.

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Wanted—More Data on Cutting Costs

IT HAS been reported that the United States Shipping Board will pump for sale 200 of the shipping board vessels. A few weeks ago there was considerable newspaper discussion of Mr. Henry Ford's offer to purchase one-third of the 1,200 vessels under the control of the Shipping Board. The newspapers had an interesting time speculating how good Mr. Ford's offer was and what he intended to do with the boats. Also, the large scrap dealers were interested. The figures reported to have been given by Mr. Ford would put the cost of cutting these vessels into scrap in the neighborhood of 72c per ton. A prominent scrap dealer said that it could not be done for less than $10.00 per ton. Somebody is evidently a long way off in his estimate of how much it costs to do this kind of cutting. It is more than likely that both of them are. Estimates made by men in the oxy-acetylene industry since this subject was brought up all fall within a range of $5.00 to $7.00 per ton. Of course, all of these estimates are based upon different methods of handling the work and different ways of providing the necessary materials and supplies. One thing is certain, that it is a mighty big job for somebody to reduce all of these vessels to charging box sizes for the steel mills. When jobs of this kind come up there is felt a decided need for methods of estimating costs which can be applied to such jobs.

Growing Like a Young Weed

TEN years ago one railroad made a record by purchasing something over a million cubic feet of oxygen in one year and nearly three-quarters of a million cubic feet of acetylene. Another railroad which is now a large user of both gases reported at that time that they were considering the adoption of the oxy-acetylene welding and cutting processes. One of the largest users of the process that same year used only ten and a half thousand cubic feet of acetylene. Another large line used less than one-half a million cubic feet of each gas. A good many of them, of course, were generating their own acetylene at that time but the small sales of oxygen ten years ago compared with the known consumption of the large railroads today is indication enough of the progress which it is possible to make in the space of ten years. There are other fields for oxy-acetylene welding representing today a rather small consumption but which, if properly developed, could be expected to reach corresponding proportions in 1935.

Another Growing Field

A RECENT editorial in *The Welding Engineer* spoke of the possibilities for the sale of welding apparatus and supplies as a result of the demand for oil storage tanks on premises where oil burning furnaces were to be installed. Some idea of the extent of the field which is already developed for this work may be formed from the fact that over 800 plumbing and heat men and more than 100 oil burner manufacturers, accessory manufacturers, service men, etc. gathered at Bloomington, Illinois, for the first national convention of makers of the Oil-O-Matic burners. This gathering drew attendance from every state in the Union and several of the Provinces of Canada. There certainly is a widespread interest in oil burning which deserves the careful attention of the welding industry, because it means that more than one good welding job will soon be multiplied by a large production factor.

The Industry Needs Handbooks of Design

IN A paper read before the American Iron and Steel Institute at New York last month by Mr. Lee H. Miller, Chief Engineer of the American Institute of Steel Construction, New York, the following quotation is interesting. "The influence of the mill handbooks was far reaching. The building codes of many cities adopted their working stress of 16,000 pounds. In many colleges these handbooks are still utilized as text books. Their compilers did a great piece of work well suited to the conditions then existing, and all honor should be given to them." The

Every other working day last year a carload of new cylinders was put into service for users of

Prest-O-Lite
DISSOLVED ACETYLENE

THE PREST-O-LITE COMPANY, INC.
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WORLD'S LARGEST MANUFACTURER OF ACETYLENE "THE GAS OF A THOUSAND USES"
BATTERIES FOR AUTOMOBILES FARM LIGHTING RAILWAY SIGNALS AND RADIO

handbooks referred to were developed by the expansion of what had formerly been mill catalogs. They were made necessary because when steel began to be substituted for iron in the construction of buildings, especially tall buildings in large cities, nobody was experienced in structures of this character. They had never been built before. Engineering schools were not able to give instruction in the matter of design because there was nothing to go by, so it became the job of engineers in the employ of rolling mills to make a special study of the manner in which structural steel might safely be adapted to meet new requirements. There is no question but that a great deal of very laborious work had to be done in those early days. The same kind of work will have to be done by engineers in the welding industry to supply a basis for instructing engineers and architects in the principles which must be taken into account when welded construction is substituted for riveted construction in steel buildings. It is not enough that the industry can prove such a substitution to be commercially possible.

Does It Pay?

DOES it pay to hire welders who can properly be classified as good welders? Does it pay to put someone in charge who is familiar with welding operations and also with the methods of applying welding to production work in such a way as to get the best results from the process? It certainly has paid in one case which was recently investigated. As far as the matter of good workmanship is concerned, a record was kept of the first four thousand tanks shipped out of the factory and it was found out that only one of that number was returned. The reason for this was that a truck had bumped into it and broken off a caster. For a long time this plant operated with a force of 57 welders and the factory record showed that the average production was sixty tanks a day. An experienced welding supervisor was put in charge with the result that before very long the working force had been reduced to 22 welders and the average production was forty tanks per day.

Many Little Welds Make a Big Job

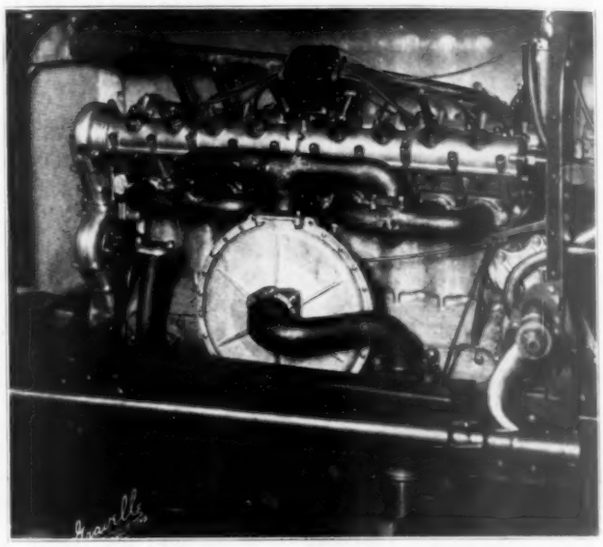
YOU could almost cover up with the palm of your hand the amount of welding that it takes to recondition the battered ends of a joint in an ordinary railroad track, but when twenty-nine railroads report a total of more than half a million of these welds in a single year at an average cost of $1.58 per joint, with the great majority of them expressing unqualified approval of the process, we find that quite a lot of work has been located for the oxy-acetylene torch through the simple process of finding out how to do one little job well. Nearly half of the railroads in the country are taking advantage of the savings made through this operation. On a good many lines it is'nt advisable to take a very extended trip without passing over a good many reconditioned joints. This is an example of how the perfection of a method for what looks like a minor application may become an important consideration when multipled by a fact which indicates the number of places where the operation can be performed.

Standardization Always Desirable

CONSIDERABLE progress has been made during the past few months by committees of the Gas Products Association, International Acetylene Association and Compressed Gas Manufacturers Association in development of standards for hose and regulator connections. Standards have been worked out which proved satisfactory to the organizations interested and the majority of the leading manufacturers of apparatus have indicated their willingness to comply with these standards in their future production. The benefits of standardization are so well known that it is not necessary to dwell upon them at length. The keynote of every standardization movement is economy. The work which has already been done by the committees mentioned is highly commendable and it is undoubtedly gratifying to the men who have worked on it to find that their recommendations are receiving such favorable attention. It probably would be gratifying all around if every manufacturer in the industry could be induced to arrange his production in accordance with the adopted standards by the end of this year.

AUTO CLASSIC WON BY WELDED ENGINE

When Pete DePaolo tore around the Indianapolis track at the rate of 101 miles an hour to win the annual automobile marathon, he was sitting behind an engine which contained



Note Welding on Manifolds and Supercharger

quite a number of welded joints. The illustration is not quite clear enough to show all of the welds but the welding of the large intake to the super charger shown in the center is plainly seen and the original photograph shows that the other intakes were similarly welded. The success of this car in the great race is indication enough that these joints were sufficiently strong to stand up under the strain of the hardest kind of driving.

I. A. A. MEMBERSHIP DRIVE ON

Under the able direction of Mr. W. A. Slack, President of the Torchweld Equipment Company, Chicago, as Chairman, the Membership Committee of the International Acetylene Association is conducting an active drive to increase the membership of the Association and thus extend its influence in the industry. The membership already includes practically all of the important manufacturers in the acetylene industry and for 25 years has been active in constructive development work which has been of marked benefit to the oxy-acetylene welding and cutting processes. The officers of the Association, however, feel that every firm which is directly or indirectly interested in these processes, even in a small way, should all be represented as members and the Committee consisting of Mr. Slack, Mr. R. E. Bruckner of the United States Gauge Company; Mr. J. I. Banash, Constructing Engineer, Chicago; Mr. A. J. Fausek, St. Louis, and Mr. H. T. Owens, National Gauge and Equipment Company, New York City, are following up all concerns whom they consider logical prospects for membership.

CLEVELAND SECTION TO HOLD PICNIC

The Cleveland Section of the American Welding Society has planned a picnic for Saturday afternoon, June 20th. The program includes a number of interesting athletic events and contests with appropriate prizes with good lunch and lots of fun for all those who attend. Over 800 invitations have been sent out to firms in Cleveland and vicinity and it is expected that the event will be instrumental in securing a number of new members for the Cleveland section.

Hints for the Welder

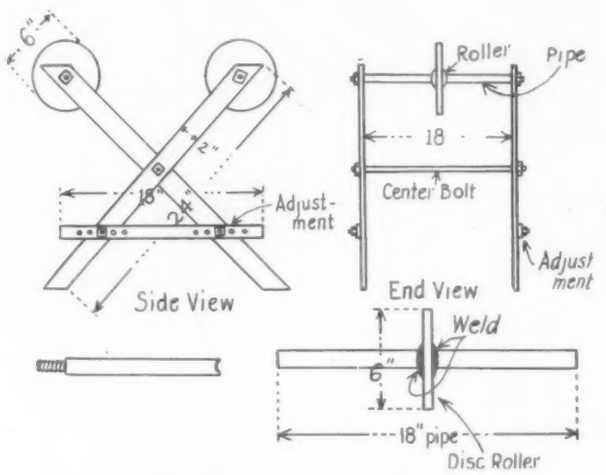
When you finish an interesting piece of work, can you set down on paper the manner in which you went about the job, how you prepared the work and how the job was done? Have you learned some little stunt every welder ought to know? Contributions to this department are paid for. Write it down any old way – I'll polish it up. Make a rough pencil sketch and our draughtsman will fix it up fine. Line drawings are more practical than photographs. Do it today!

TWO HANDY ROLLERS FOR HANDLING PIPE OR TANKS

First is an adjustable pipe or tank roller, built so that it can be spread apart or narrow to suit circumference of any tank or pipe.

In the second sketch is shown an end view of roller rack. The side irons, which form an X, should be about 24 inches long and made of 2x⅜ to insure strength and proper height for comfortable work.

The bolt through the center of the two sides should have an offset turned on each end as shown, to prevent the sides from wobbling or slipping towards the center.



Adjustable Pipe or Tank Roller

The strap iron which is used as an adjustment may be made of 1½x¼x18 inches. Drill a number of ½ inch holes about one inch apart starting at each end.

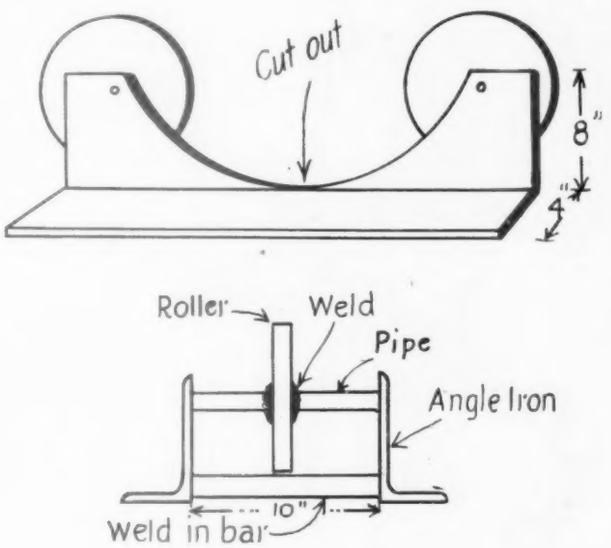
By this time we are ready to make our rollers. Some use 6-inch pullies, but the best type of roller is cut out of a 6-inch disc of ¾ or ½-inch boiler plate.

Cut a hole in center large enough for a ⅝ bolt to turn in. Cut pipe 18 inches long, then square up disc and in center of pipe weld on both sides. Before putting together, grind off all rough edges on cutting edge of disc. When you have completed this pipe or tank roller you will find it the most efficient thing of its type you have ever used.

Second is a roller made of two 8x4 inch or 6x4 inch angle irons cut out to fit the radius of the tank or pipe. The sketch shows end view and how 1½x¼ inch strap iron is welded across end to brace angle irons, also to space distance between the two angle irons.

Then make rollers, same as for adjustable roller rack, except that it is advisable to make rollers larger, about 8 or 10 inches in diameter. When drilling holes for rollers, place them as near the top and as close together as cut out space will permit. As for distance between angle irons, space them about 10 inches.

This pipe and tank roller is not adjustable, but when properly made is more suitable for handling large tanks on than the roller first described, although if you have a variety of work it will take several sets of them to accommodate all sizes of pipe and tanks.



Good Roller for Large Tanks

ORGANIZATION COUNTS IN RAIL BONDING

An interesting account of the bonding operations in connection with electrification of forty track miles of road by the Staten Island Rapid Transit Co. is given in a recent issue of the Ohio Brass Company's Bulletin, by W. P. Bovard, commercial engineer for that company. "Gas weld bonding is used," says Mr. Bovard, "and all running rail bonds were installed as new rail was laid. A new type of steel terminal gas weld bond was developed for this work, each joint being bonded with two 250,000-c. m., 13½-in. bonds. Installation presents no interference with working of joint bolts, and the weld is bevelled for wheel tread clearance. Bonding of special work is carried out with 500,000 c. m. bonds having terminal design similar to the joint bonds. The gas weld method permits bonding of special work at low cost and with a high degree of efficiency in conductivity and life, with attractive appearance installed. Remarkably few installation difficulties were experienced in this work, which was carried on through the summer of 1924, in the most part under traffic. By proper location of gas tanks when unloaded from the work trains, a minimum moving of welding equipment was affected. One lorry and two men proved sufficient for all necessary moving

Oil and gasoline barge, completely arc welded

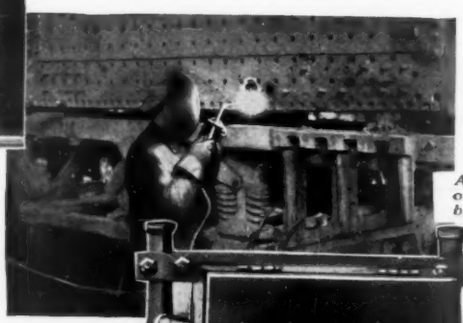
A welded pipe line

Arc welded steel piping in gas plant

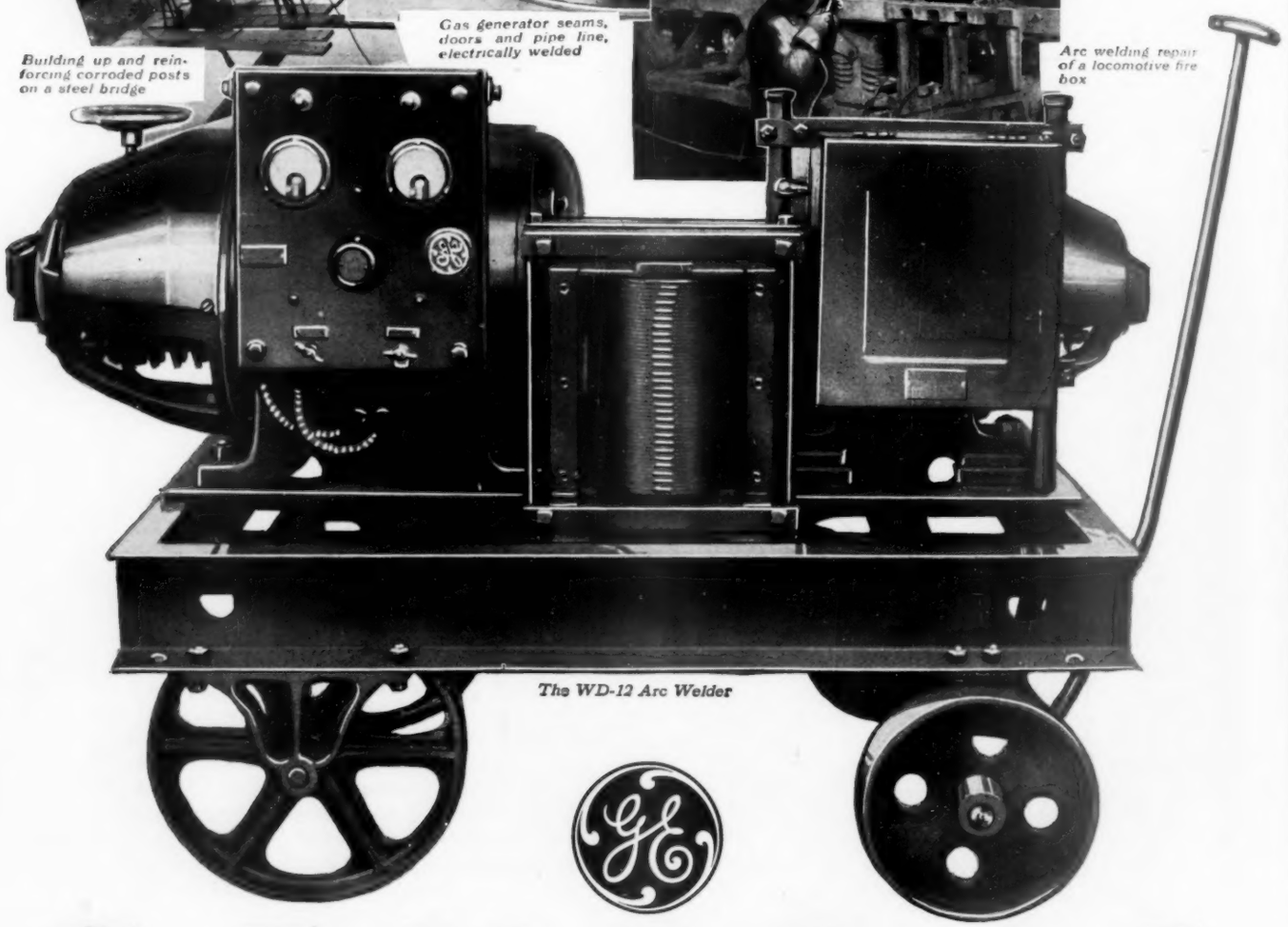
Master Metal Welders

Building up and reinforcing corroded posts on a steel bridge

Gas generator seams, doors and pipe line, electrically welded



Arc welding repair of a locomotive fire box



The WD-12 Arc Welder

GENERAL

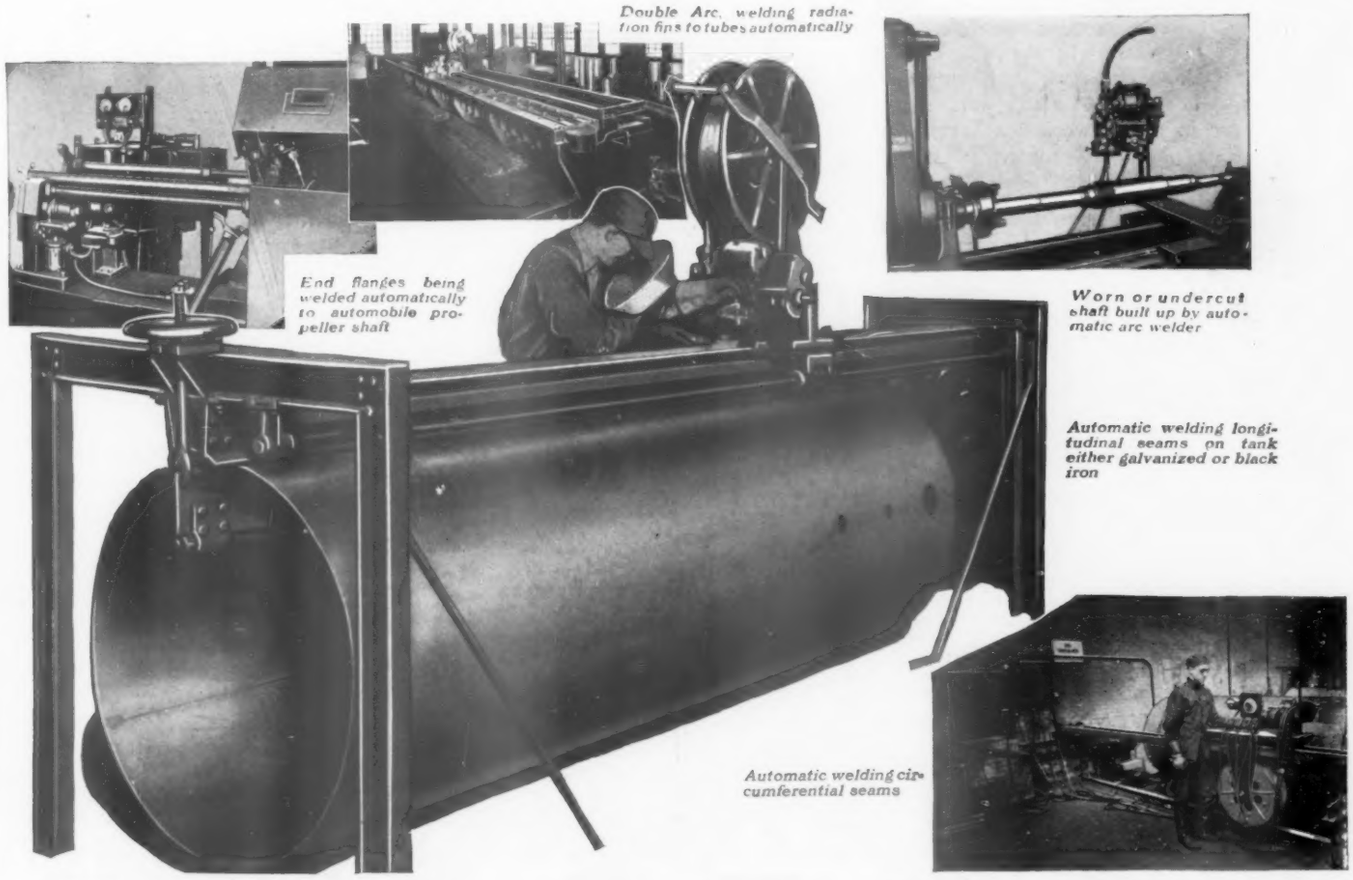
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

NO matter how difficult the fabrication or repair weld may be, there is a G-E Welder to do the job. Only a few of the applications can be shown here, but these indicate, at least, the great possibilities of arc welding.

Two types of G-E Welders—the WD-12 and the Automatic—deserve your especial attention. The WD-12 consists of a motor and a self-excited generator with a handwheel to regulate the welding current. A reactor keeps the arc stable. Jobs a thousand feet away as well as near at hand, can be easily handled. The WD-12 gives 24-hour service day after day. It can be used to provide power for the automatic. *Adaptable, simple, dependable*—describes it briefly.

Considering the results obtained, the Automatic Welder is simple both in construction and operation. Where applied to quantity production it is providing astounding economies, because of the speed and uniformity of the welds. The Automatic is a tirelesss worker—there is no afternoon let-down either of speed or quality. Its foremost applications have been to welding seams and depositing metal in restricted areas, but new uses are continually being found.

G-E Welding Electrode also has specific advantages as it makes any welding easier and better. For complete information about arc welding, communicate with the welding specialist in the G-E sales office nearest you.



Double Arc welding radiation fins to tubes automatically

End flanges being welded automatically to automobile propeller shaft

Worn or undercut shaft built up by automatic arc welder

Automatic welding longitudinal seams on tank either galvanized or black iron

Automatic welding circumferential seams

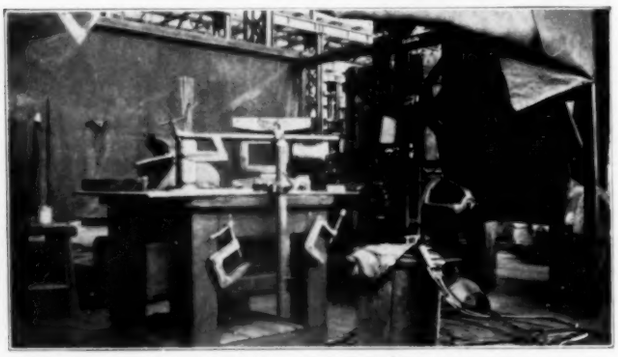
ELECTRIC 23-10

SALES OFFICES IN ALL LARGE CITIES

of equipment and gas supply for six welding crews. Hose length was provided in each equipment for permitting installation at five points with one location of equipment. Little trouble was experienced in training welding operators, who were all inexperienced in this class of work. Each welding operator was provided with a helper who located bonds, moved along miscellaneous equipment and warned against approaching trains. The latter is an important factor as the noise of an approaching train is drowned out by the noise of the oxy-acetylene flame. No trouble was experienced with any of the welding equipment throughout the installation."

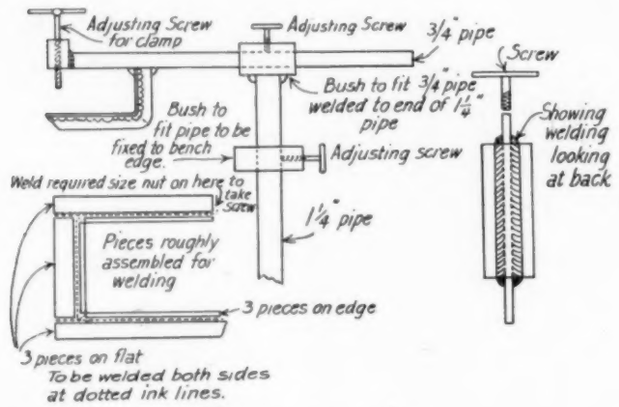
HANDY SHOP DEVICES

In production welding it is always advisable to provide jigs or holding devices to speed up the handling of materials, and it is easy to do this when the size and shape of parts to be welded are standardized. When it comes to repair work,



Well Equipped Welding Table

though, we find so much variety that usually the job must be handled as best it can. Many welders meet this situation by rigging up ingenious work benches just suited for repair welding. This photograph, which was recently forwarded


Adjusting Screw for clamp
Adjusting Screw
3/4" pipe
Screw
Bush to fit 3/4" pipe welded to end of 1 1/4" pipe
Bush to fit pipe to be fixed to bench edge.
Adjusting screw
Showing welding looking at back
Weld required size nut on here to take screw
1 1/4" pipe
Pieces roughly assembled for welding
3 pieces on edge
3 pieces on flat
To be welded both sides at dotted ink lines.

Details of Vise and Clamps

from a subscriber in Australia, shows a handy arrangement, and the drawings show the construction of a bench vise, easily adjustable to any angle or height, and of handy clamps, easily fabricated from scrap material by a resourceful welder.

BRONZE WELDING CAST IRON GEAR TEETH

By Charles Haeusser, New York

Bronze welding cast iron gears is no longer an experiment with us for we have found it to be a dependable, successful process. Experience has shown us that the bronze gear teeth are stronger than the original cast iron teeth. In a competitive test the bronze teeth held while the cast iron teeth broke.

An outline or illustration of the procedure may be of benefit to some of the welders out in the field. Recently a 400-pound gear from an ice house elevator was brought in for repair. It had twenty-five broken teeth, most of them being broken at the very base of the tooth. First we cleaned the teeth with a wire scratch brush and then inserted a short piece of pipe in the hub. Next a piece of chain was passed through the pipe and the gear was hoisted about six inches above the ground. A chain hoist was used. This allowed us to turn the gear, as the occasion demanded, in a vertical position. We found this was very helpful during preheating and welding.

After raising the gear it was surrounded with an inclosure made of sheet iron and fire brick. The top of this was covered with asbestos paper. The whole gear was then preheated slowly for about four hours. A charcoal fire was used and the gear was revolved from time to time. This prevented uneven heating and subsequent cracking of the spokes. The paint and grease on the gear smoked quite a bit, but when it finally stopped we started into work. A hole was torn in the asbestos paper and the gear was revolved until the broken teeth appeared at the hole, one by one. Each tooth was welded in turn, and I will now discuss the bronze welding process.

A piece of carbon is placed on each side of the broken tooth and the flame of a tip giving a large soft neutral flame is played on the gear until a space about one-inch square gets cherry red. At the same time the rod, which has been dipped in flux, is melted and rubbed into the cherry red spot. If properly done, the bronze will sink or seem to soak right into the pores of the iron. After the foundation of the tooth is laid, the rest of the tooth is built up to the proper height. The carbons are brought closer together at the top and held in position by melting a drop of bronze behind them. When all of the teeth have been welded, the hole is closed, and the entire job is left until the fire has died out and the job cooled off.

Naturally the next thing to be done after the job is cool is to finish off the teeth. To do this we use a compass, chalk, square, scratch awl and a sheet iron template of the correct shape of the teeth. In addition a couple of sharp cold chisels and a heavy hammer are needed. The first operation is to cut off the ends of the teeth, these are leveled with the cast iron ones. Then the height of the teeth is corrected with the height of the cast iron teeth. The correct size is designated by the use of the template. During my experience with this method of finishing bronze gear teeth I have done over 300 of them without breaking a single one. The average size of the chip cut is about 1/16 inch.

On this job it took about ten hours to preheat and weld the twenty-five teeth and about fifteen hours in addition to finish and dress the teeth. The cost to the customer was $40.00. He was very pleased because the price of a new gear would be about $80.00 and it would have taken over a month to get it delivered and installed. He would have lost the entire ice harvest.

WELDING REPAIR ON MOTOR

By Joseph Heaton, Jr.

One of the unusual jobs which came to me recently was that of welding a broken foot on an electric motor. My problem was to use little enough heat to keep from burning the insulation from the windings which were perfectly good. At the same time the weld had to be strong enough to stand the bumping and jarring it would get in transportation. This was a 7 H.P. alternating current motor with a 250-lb. cast iron frame. I did not attempt to weld the cast iron because it would take so much heat and expansion and contraction would warp and maybe crack the frame. Neither could I preheat because of the danger of burning the windings, so I decided to braze it with Manganese bronze and a special brazing flux. As the brazing might not be strong enough on account of the foot projecting out from the motor so far, I drilled three ½-inch holes into the broken stub of the old foot then screwed three ½-inch bolts in these. I then bent them out to the shape of the foot. This gave me a strong foot, also a backing for my weld. Then I brazed all around on the surface of the cast iron with ⅛ Manganese bronze rod

Tobin Bronze Welding Rods, because of their uniform composition and dependable quality, are recognized as standard for butt-welding cast iron pipe.

Tobin Bronze welds 13-foot fracture in water main

These illustrations show how Tobin Bronze Welding Rods were used to seal a 13 foot fracture in a water main at Washington, D. C.

Tobin Bronze—an exclusive product of the American Brass Company—melts at 1625°F., flows freely at 1650°F. and makes joints 100% stronger than cast iron and equal in strength to steel welds.

The use of Tobin Bronze Welding Rods eliminates the expense of pre-heating the parts to be welded since it flows freely at a comparatively low temperature. The welds, which are strong and tough, can be made with considerable saving of time and money.

If your regular source of supply does not handle *Genuine* Tobin Bronze rods with the name stamped in the metal, let us tell you where they can be obtained.

THE AMERICAN BRASS COMPANY

GENERAL OFFICES: WATERBURY, CONNECTICUT

Offices and Agencies in Principal Cities

Canadian Mill: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

TOBIN BRONZE

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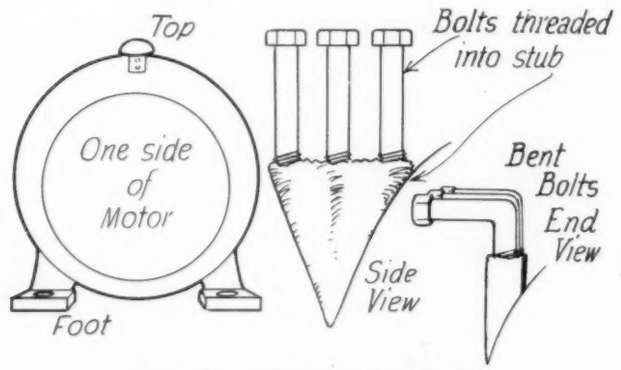
WELDING RODS

using a cast iron brazing flux. After the cast iron was covered with bronze at the joint I used ¼-inch brass wire with common brazing flux. This was because it is more economical and easier to puddle. The brass was applied until it was all filled in and formed like the other foot of the motor. The reinforcing rods gave me the strength which I wanted to add the foot of the joint to the motor and there was so little heat used that the windings were not even charred. It was easy



Novel Way of Building Up Foot on Motor

to dress the weld because there was no hard spots. I put it on our surface grinder and trued it up with the other three so that it stayed in place without wabbling. Then I drilled a ¾-inch hole in the foot for the base bolt, and after painting it was hard to tell which was the welded foot.

PICKING PROFITABLE WELDING JOBS

By C. Haeusser

To my mind, welding is a most fascinating science and occupation. But as a profitable business proposition, certain elements must be eliminated as far as possible. Our system is not perfect, but it pays, even if we do "get stung" occasionally through some error of judgment.

Our welding shop is a kind of first aid hospital for machinery troubles. Although we do all we can for every case, we refuse to take a case when the injury is vital or hopeless. Long experience taught us some discrimination. If we accept a job, we "make good," win or lose. If we lose money on a job, we are usually recompensed by valuable experience. About 95 per cent of our work turns out successful, giving satisfactory service. 75 per cent of this work gives us a profit which keeps us in business.

When we are not busy, we experiment on some of these "can't be done" jobs and often find a way of doing them successfully. These experiments enable us to accept work at a profit, that we once refused.

If you are an employee of a railroad or corporation, you can take all kinds of chances and get away with them, because occasional failures are expected, as a "matter of course." But running a public welding shop is different. Alibis and excuses don't go. If you take a job, it's a contract and you must "make good." Every job must be straight and strong, equal or better than a new casting at a price mutually profitable. Refusing a job on the ground that "it can't be done," would be presumptuous. We tell a customer plainly and frankly, why we will not tackle his job; "yes, it's only a small hole, but gasoline tanks must come off the machine and be filled with water before we will weld them. You had better get a new bracket," we suggest. "If we weld that one, it will not hold, because the iron has not been properly malleablized"—"That's such a cheap casting, it will be better for you to get a new one," we tell another. "No, we won't solder that crack and guarantee it; but if you will have it taken off the machine, we will braze it and guarantee the job to hold for $3.00." "No, we never weld gears in the gear case," and when he tells us, if he goes to the trouble of taking them out, he'd better put in new ones, we heartily agree with him.

Likewise, we turn down internally cracked cylinder blocks, cracked buzz saws, broken coil and leaf springs. To protect our reputation, we hold ourselves responsible for results and will not try to defy natural laws to please an inexperienced customer. In the long run we win their confidence and friendship; however, the work we turn away is only a small fraction of the work we accept.

Our policy is, "Service." We deem it more important to help a customer out of a hole, than to get his money. When things are breaking badly for our friends, they are breaking well for us. But, we try not to feel as mercenary about it as the undertaker, who finished six funerals, claiming he had a lovely week.

While avoidable losses can be cut down in this way, even the utmost precaution and skill will not prevent all come-backs, some of the causes of these are entirely beyond the welder's control. For instance; we welded a crankshaft, which had broken because the bearings were out of line. The mechanic replaced it without remedying the condition that broke it. It ran a week and of course, it failed again. Another time, we welded a broken bell crank. It came back a few minutes later broken in a new place and the boy who brought it in told me it broke because the machine tender, in his haste, forgot to remove a monkey wrench from the gears when he started the machine.

We often weld extra lugs near the bolt holes of hollow or arched castings, to make them foolproof against the strong boy with an 18 in. monkey wrench.

No matter how strong you make the weld, it must break if something goes wrong. Heavy fly-wheels don't always stop, belts don't always break and motor fuses don't always blow; then something must break. Then it is taken off in a hurry, welded in a hurry, put back in a hurry, breaks again in a hurry because the helper, in his hurry, did not fit it, or put it on backwards, upside down or out of time. We weld it again, free of charge, hoping for better luck and profits on the next job.

Another time I welded a lug on an aluminum crank case but this one did not hold. Looking for the cause of the failure, I found all the rivets in the frame were loose and our welding job had the responsibility of holding the rickety thing together. He refused to have the rivets tightened, so I cancelled the bill and refused to do the job over.

A few weeks ago I was asked to weld a large cast iron dryer cylinder, 16 ft. long, 3 ft. in diameter, weighing about 5 tons. It is cast in two 8 ft lengths, bolted together in the center inside with 24⅝ in. bolts. The girth seam is a ground joint, white leaded. This girth seam leaked, because some of the bolts had stretched and others had broken. They wanted me to weld it solid into one piece, which would have cost them over $100.00. After carefully analyzing the conditions which strained this $3,000 cylinder, I refused to weld it, explaining the underlying condition which broke it, which was unequal expansion and contraction, when steam was turned into this cylinder. The upper side got hot first and expanded, while the water in the bottom kept the lower side cool and contracted. I considered welding this cylinder too much risk and responsibility. We don't claim that our welding is stronger than the irristible forces of nature as manifested in expansion and contraction, so I recommended refacing and bolting.

The only work that makes money for the customer and the welder, is that which stays put.

ARC-WELDING OF CAST IRON

By B. K. Smith

A great deal of improvement has been made in the arc welding of steel, but results in welding of cast iron or malleable iron have been unsatisfactory. Here and there one claimed that he welded a cylinder or a bed plate of an engine, but such welds were usually made with the use of studs and the weld was not machinable. With the use of studs and special filler rods, some welds on heavy castings were made successfully but they were generally expensive.

The veteran oxy-acetylene welder remembers a similar exper-

ience with the welding torch on cast iron. Many attempts were made, using fence wire, cast iron bars and brass wire as a filler rod, without success. Metallurgy came then to the welder's rescue by developing the proper filler rod to be used for cast iron welding.

Another obstacle was then met by the welders and that was the oxidation, preventing the welder from homogenously uniting the filler rod with the casting to be welded. The reason was that the iron oxide thus formed, being of a higher melting degree than the iron itself, formed a barrier between the iron of the filler rod and the iron of the casting to be welded. Chemistry helped us out then, and recommended a flux which dissolved this iron

Left—Ready for Welding. Right—After Welding.

oxide, thus making it possible to unite the iron filler rod with the iron in the casting.

We are now experiencing practically the same thing with the electric arc welding process. We have been trying out various filler rods, various preparations, meeting both success and failures, but it is still something of a problem to weld cast iron with the electric welding machine so it could be done without preheating, without the use of studs and to secure a soft machineable weld.

A few months ago one of the largest welding contractors in this country repaired a large broken cast iron cylinder for a gas engine with the oxy-acetylene torch, using the brazing method. In order to realize the size of this welding or brazing job, we will mention the fact that the cost of this job was $1100.00, but the job failed. This welding contractor has also several arc welders, but the latter process could not have been employed, because it was impossible to stud the cracks on the cylinder.

I was then called on the job as demonstrator, to give an opinion as to whether the cylinder could be reclaimed. At about the same time one of our demonstrators has perfected a compound or flux, and that same demonstrator stated that he could weld this cylinder—and he did. He made an excellent job of it, using his flux and an inexpensive filler rod worth 15c per pound. The greatest drawback he had was the bronze that was previously applied and that failed. He did not preheat the cylinder, he did not apply any studs, but his welds were soft and were in some places filed, drilled, tapped and shaped without any difficulty.

He used a 300 ampere arc welder—motor generator type, on straight polarity, the same as one would weld steel. The cracks were beveled and cleaned good. If the work was horizontal, the flux was liberally sprinkled before welding. If vertical, then the flux was mixed with water so as to form like a thick dough, and then applied on each side of the bevel. A high amperage was used, but the welding was slow. Instead of making the welds in a longitudinal way, he made his welds in the form of bridges across the bevel. These bridges were made about one inch wide, the full depth of the bevel, about six inches apart. In other words, he had about every six inches a bridge welded one inch wide and the full width of the bevel. These welded bridges kept the casting rigid and cool, thus preventing it from cracking or deformation. After every inch welding, the surface was covered with the flux. The filler rod or electrode was also dipped in the flux about every inch of welding.

After the necessary bridges were welded, the operator welded the spaces between the bridges in the same manner as described above, but alternatingly, moving from one place to the other so as not to overheat the casting at one place. It required eight days to prepare and weld this casting, but the saving on this job to the owner was over $18,000.00.

Since then we have welded three large pump cylinders on the same basis, with good success. These pumps carry from 850 to 900 lbs. pressure, and the strain on weld changes on an average of fifty times per minute from 0 to 900 lbs. pressure.

Figure 1 shows one of the cylinders before welding and figure 2 shows it welded and finished ready to replace on pump. The finished welds appear more like a gas or forge weld without any red oxide covering. The writer after welding several specimens of cast iron pieces, has tried to break them on the weld in any possible manner but could never cause fracture in the weld.

WELDER HAS OWN BUSINESS AT HOME

This is the story of a very interesting little shop in an Iowa town. More so is it interesting because of the fact that the business is carried on at home outside of the proprietor's hours of regular employment as welder in a larger local plant doing other than commercial work. Starting with portable tanks, business grew

A Welder at Home.

to the extent that it was found convenient and paying to install a 50-pound low pressure generator. The undertaking occupies a small building 12 by 16 feet near his home. "Business is good most of the time, and fair all of the time," says the 'boss." The range of the work finding its way into the little shop is interesting, for people are realizing just how much the welder can save and do for them on almost every metal object liable to breakage.

A QUICK AND USEFUL HORIZONTAL TANK CHART

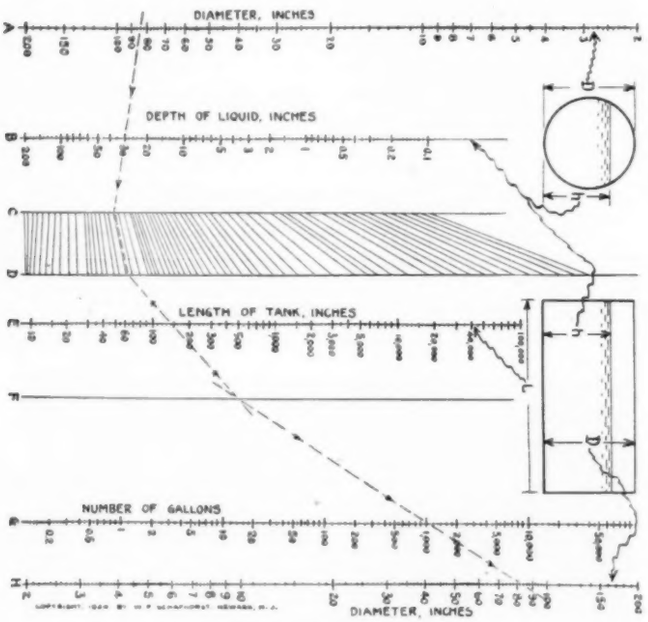
By W. F. Schaphorst

HERE is a chart that gives the gallons of liquid in any horizontal tank without the use of tables, formulas, figures, or computations of any kind.

Simply start at the left and zigzag a ruler of thread across the chart three times as demonstrated by the dotted line and the number of gallons is immediately found in Column G. For example: How many gallons in a tank 84 inches in diameter, the depth of liquid being 30 inches, and the length of the tank being 142 inches?

Run a straight line through the 84 Column A, and the 30 in Column B and locate the intersection with Column C. By means of the eye follow the radiating "guide lines" to Column D, locating a second point of intersection. From this latter intersection run through the 142, Column E, and locate the point of intersection in Column F. Then from this point run over to the 84, Column H, and the intersection in Column G will be found to be close to 1,050 gallons, which is the answer.

One of the great advantages of this chart is that it takes care of any depth of liquid from 1/10 of an inch to the full capacity of the tank. All guess work is eliminated. To make the chart absolutely clear the writer has included sketches showing the diameter of the tank D, the depth of liquid h, and the length of tank L with wavy arrows leading from them to the proper columns. By following them no mistake can be made.



A Very Useful Tank Chart.

The range of the chart is amply wide. It will take care of any diameter from 2 inches to 200 inches and of any length of tank from 10 inches to 100,000 inches.

This chart will give an answer much more quickly than tables or formulae. It is surprisingly accurate. It is more complete than tables because it takes care of every dimension between 2 inches to 200 inches wheras tables generally skip many diameters and lengths giving only 24 in., 28 in., 30 in., 32 in., etc.

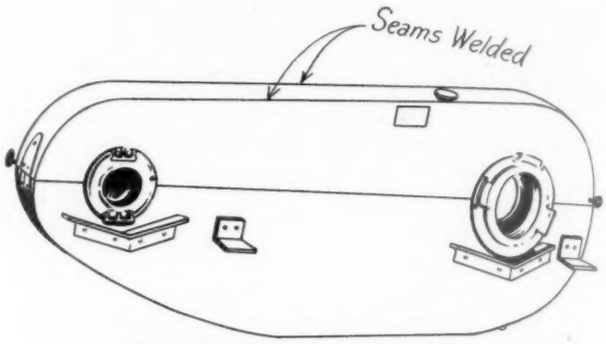
To avoid confusion all dimensions are given in inches.

Since Column E takes care of length of tanks up to 100,000 inches it is plain that not only will this chart compute tanks but it will include long pipes whenever it is desired to compute either the full capacity of such pipes or their partial capacity. 100,000 inches is equal to 8,333⅓ feet.

Inversely the chart may be used very conveniently for determining the length of tank necessary to hold a given number of gallons where the diameter of tank and depth of liquid are known or fixed quantities as is often the case. The method of applying the chart to problems of this character is so obvious that further directions are unnecessary.

WELDING PROTECTS SILENT CHAIN TRANSMISSIONS

The seamless, leakproof joint, the welded joint in other words, is an important factor in the manufacture of casings for silent chain power transmission. An article in a recent



Protecting Silent Chain Transmissions.

number of the Industrial Engineer points out that by enclosing silent chain drives in casings such as shown in the sketch we keep out dust, retain the oil, and increase the safety. Welding is the ideal method of construction, and it works on this job with practically no handicap, because a corner seam of this type is easy to make.

PEERLESS BRAZING FLUX

The Peerless Flux Company, Philadelphia, is placing on the market for the first time a brazing flux used locally for the past eighteen years, for which superior results are claimed. Among other advantages, the flux is said to cleanse dross from castings and insure a soft smooth finish that is easily machineable.

Large castings and forgings, including steam cylinders, steel frames, large pieces of cast iron, steel, brass, and bronze have been brazed with especially good results reported. The flux is recommended for the brazing of brass, copper, iron, cast iron, steel and all metal parts where brazing is practical. Distributors are sought.

CUTTING ARMOR PLATE

Efficient performance on the part of the cutting torch is shown in the accompanying photographs which were recently forwarded by the Purox Company of San Francisco. Two of these views show the cutting torch in use in a Pacific Coast shipyard where 8-inch armor plate is being cut at the rate of 11 inches in six minutes at a pressure rate of sixty pounds. The third picture shows the operator cutting 12-inch rudder frames with sixty pounds of oxygen pressure at the rate of 1½ inches in three minutes.

WELDING MAKES PIPE LINE JOB POSSIBLE

About eight months ago the city of Morgan City, Louisiana, had the problem of laying 1,700 feet of pipe line across the Atchafalaya River. The pipe was standard gauge steel pipe made up in the ordinary way with sleeves. Attempts to lay it in the ordinary way had failed because on account of the 60 foot depth of the river the pipe would break just behind the sleeves where the threads stopped.

This Welder and Outfit Did the Work

Finally the Baton Rouge Welding Company was called upon to estimate the possibilities of welding. When a welder arrived there was quite an argument as to whether it was possible to make a weld which would hold but it did not take very long to decide how to make a test. He welded one section 100 feet long and asked the doubters to break it. They took the 100 foot section after it was welded and raised it high enough from the ground so that the center was four feet clear of the ground. Several of those who were most determined to break it jumped up and down on it but they only succeeded in bending the section 8 feet from the weld. The weld itself showed no fractures after this test, therefore, a welding contract was arranged and the entire 1,700 feet was welded, making a total of 200 welds on six-inch pipe. After the pipe had been laid four days a conversation was carried on through the pipe from one side of the river to the other in order to show that there were no leaks in it. The pipe has been in use for seven months at a pressure of 125 pounds, this being the water line from the town of Morgan City to Berwick, La.

WHAT WELDING MEANS TO THE FARMERS

Those who follow the wheels of industry in the cities, little realize what welding really means to the rest of the world, the farmers, for example.

When crops must be planted or when crops are a golden mass and ready for the harvest, imagine what it means to the farmer to have a part of his machinery break down and to be compelled to wait from ten days to two weeks for repairs when perhaps at that very moment, clouds are drifting along the horizon which are sure to bring rain in a few days. Very few farmers have a surplus of tools, and when one farmer needs his implements, his neighbor is almost certain to be using his also. Farm machinery is similar to the automobile, in that there are orphaned farm tools, repairs for which are not available at any price. Also few dealers carry a full line of repairs, depending of course on size of the dealer, which is usually governed by the size of the town. In such a case you can easily see there is but one answer, "weld it."

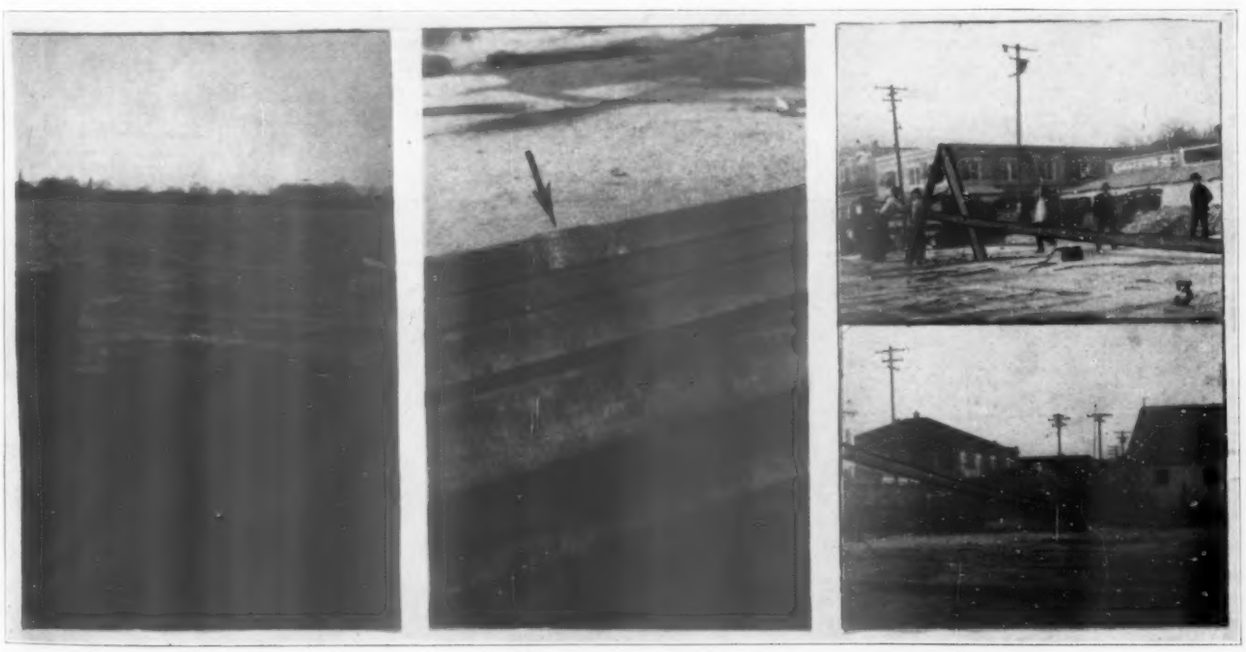
The writer entered three large hardware and implement stores in one of the most progressive agricultural town of the middle west, a town which is wholly supported indirectly or directly by agriculture, and asked them what effect welding had on their business. All three of them gave the same answer, they said they carried only a small stock of parts that were subject to breakage as there was so little sale for them. It was dead stock. "We just send them to a welding shop, that is the few that do not go there first. So you can see what it means to our farmers."

Most of the people who have been raised in the cities cannot understand what can break on a farm.

The average farmer has as much as $1,000 invested in farm machinery. Some have many times that much. All of this is subject to wear and tear. Any one familiar with machinery knows that it is subject to breaking, usually when needed the most and when least expected.

In our case sometimes a machine is broken by striking a stump or the team running away, or in a similar way.

The writer then visited ten of the most successful farmers in this community and inquired whether they believed in welding and they all ten declared it to be the greatest achievement of



1. View of the Atchafalaya River from Morgan City Side. 2. Close-Up of Weld. 3. Getting Ready for the Test. 4. Another View of the Test

modern progress they knew of and also stated they did not know what they would do at times if it were not for welding.

Then ten non-progessive farmers were interviewed. They were a class which success had passed by according to all appearances, but eight out of the ten believed in welding and had had welding done when necessary.

Perhaps the reader is wondering by now where the farmer gets his welding done. There probably isn't a farmer in the United States who is not in reach of a welder in a case of necessity. You will find welding done in almost all small towns, either in a garage or a blacksmith shop, or if the town is large enough to support a welding shop, there is usually one or more.

Some welders make a mistake by turning down small jobs remarking: "It is not worth welding." It is, if only to get people into the "have it welded habit." Even if you lose money at the time, it will bring returns.

You must convince people that it can be welded, that "can't" isn't in a welder's life.

There are some people, especially on the farm, who don't believe in acetylene welding, but there are also people who still argue that the world is flat. We have schools to teach our future citizens that the world is round, but no schools to teach that cast iron can be welded or malleable can be brazed. Therefore it is up to the welders to teach people what welding really means to modern progress.

There is still room for welding shops in small towns which would of course be supported by the farmers and small industries. There are even locations that would support a welding shop, without the aid of a connecting business such as radiator shop or general repairs to support it.

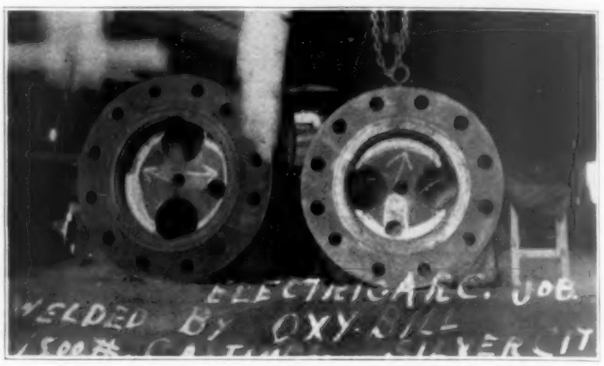
Too many welders dream of big jobs, which perhaps will never come. That is why there aren't more small town shops.

The farmer usually has to contend with a lot of poor welding done by incompetent welders whereas a good welder could work up a much larger trade by convincing people of the efficiency of welding.

WELDING IN NEW MEXICO

A letter recently received from Mr. W. J. Hamlett, proprietor of the Hamlett Welding Shop, Silver City, New Mexico, gives some interesting views on the conduct of a job welding business and on some of the experiences which a proprietor enjoys.

"I have been a reader of *The Welding Engineer* from 1916 to 1925," states Mr. Hamlett, "and enjoy each issue more and more as I read them. Ours is one of the largest and best equipped gas and electric welding shops in the Southwest, so on account of our reputation we have plenty of applications for jobs. There are over 99 different kinds to pick from, but they all have a good line of talk. Nearly all of them have welded jobs so big that no electric crane could lift them. Also, most of them have had at least five years experience and tell me confidentially that they know every trick in the welding game. I soon find, however, that one of these fellows will look around the shop and seeing a job which is not particularly difficult say 'You are not going to tackle that job, are you?' I always claim that the harder the job the better the advertising I get out of it when it is finished. In fact, I think that the best advertising a job welding shop can have is a reputation for turning nothing away. If it looks impossible I find a way to do it and I take pains to grind it nicely and paint it so that it will look like a finished piece of work. I know that this is a good policy because my customers often take pains to show their jobs to other people.



Two Welded 1800-lb. Castings

"Welders who don't understand this policy often say it doesn't pay to spend so much time on a job and just weld it and let it go at that. That stuff goes when they are welding for large companies such as mines and railroads but I know from experience that custom welding shops have to please the customer. In our shop we get welding of every description and we turn down nothing, big or little. I believe in helping my welders teaching them everything possible about the work, such as preparation of the work, preheating, selection of welding rods, etc. Also, I always advise the customer to have a job welded and never tell him to buy a new piece. Customers usually have no idea of the process so jobs which they think are impossible are in reality quite simple and jobs which they expect to have done while they wait will take several hours on account of necessity for preheating and annealing. You may be interested to know that this is a great health resort as it is 6,300 feet above sea level. But, I am not here for my health as I am 6 feet 3 inches tall and weigh 2'2 pounds and wear a number 12 shoe. When I tell a man what my price is he usually thinks it is all right.

Welding Shop Equipped to Handle Any Class of Work

"We are very proud of the equipment in this shop and take pains to buy the best welding rods, best flux and best hose that we can find on the market. We always insist upon doing a good job whether it is for charity, credit or cash and believe that we are building up a profitable reputation through this policy."

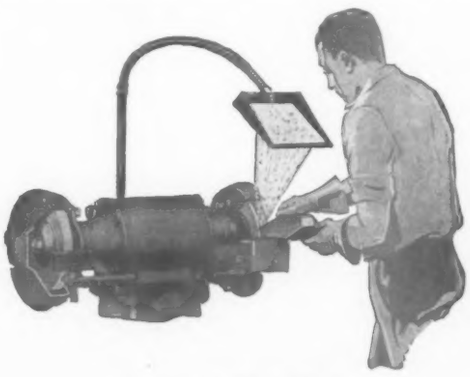
NEW REGO MASTER SHUT-OFF VALVE

A new type of master shut-off valve listed as the Rego No. 937-C for use with high pressure gases has just been developed by the Bastian-Blessing Company, Chicago, manufacturers of Rego welding and cutting apparatus. A blueprint showing a cross sectional view of the valve indicates that it is of the stem packing type with a swivel monel metal point attached to a Tobin bronze stem. The manufacturers state that these valves are now carried in stock and prompt delivery can be made.

A further improvement in Rego valves which has been announced consists in tapping all Rego valves so that a piece of brass tubing can be inserted in the inlet of the cylinder valve to act as a trap, preventing scale on the inside of cylinders from blowing into the oxygen valve. This condition has, in the past, been a troublesome one, necessitating the removal of seats and income cases causing leaks in the oxygen regulators.

NEW FORM OF PROTECTION FOR GRINDERS

The Acme Shield is a device recently perfected by the Chicago Eye Shield Company to eliminate eye accidents on grinding wheels. This shield practically puts a protective window on the machine and is made so that it can be attached directly to the grinder or to the post or wall behind it. The manufacturers state that the Acme Shield insures absolute eye protection to men using grinder wheels and, at the same time, does not interfere with the work because it is instantly adjustable to any position. As stated in their little descriptive



Protection for Grinders

folder, it puts the goggles on the machine instead of on the man. The glass used in the construction of this machine is non-scatterable so that it not only prevents particles of emery or steel from getting in the workman's eyes but also protects the head and face in the event of larger objects striking the glass. Flying objects will not go through it. The glass is 7x9 inches mounted in a steel frame and so arranged as to be easily replaced if broken. Adjustment to different positions is obtained by a flexible arm. The price is quoted $9.00 f.o.b. Chicago.

WELDED STEEL TO HOLD BUILDING

At a cost of approximately five hundred dollars and through an unusual use of electric arc welding the Lincoln Electric Company of Cleveland, has successfully erected steel braces between its office and factory building unit which are preventing further sagging of steel beams and the pulling apart of the structure.

For a number of years the two units of the plant had been gradually pulling apart, bringing about a gradual sag in the roof and endangering the entire plant. The sagging resulted from the fact that the back is on land with a four foot fill, which as it settled down at the rear of the property tended to pull the factory away from the office building.

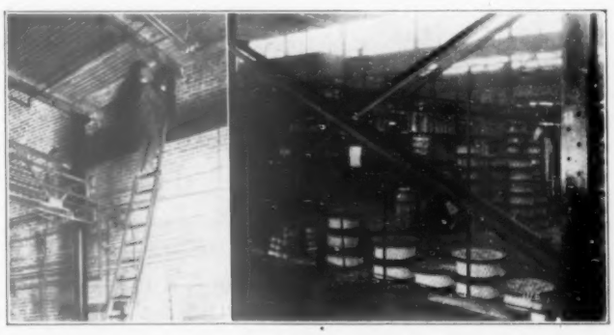
In an effort to straighten out this condition the company tried numerous methods of applying supports and spent a great deal of money, according to J. F. Lincoln, vice-president of the company. None of the attempts succeeded until the welding of the steel braces was tried.

Mr. Lincoln reports that the sag, which had developed over nearly a ten year period, has now been entirely eliminated and that it is certain that there will be no further pulling away of the factory from the office portion of the structure, regardless of further settlement of the rear of the plant. Lincoln

A Section of This Building Started to Pull Apart

engineers made the repair on the building themselves through the use of steel bridge construction to support the sagging members. This was done at a saving of thousands of dollars on repairs alone.

The importance of this piece of welding work may be better appreciated when it is realized that it is safeguarding an industrial structure, the reproduction value of which is better than $350,000.



Welder at Work on Steel Members and Cross Bars Used as Braces

The strain that the welded steel is successfully withstanding may be understood, from the fact that the factory portion of the structure alone covers a total of 90,000 square feet of floor space. While the plant is of the single story type, the office unit is two stories in height.

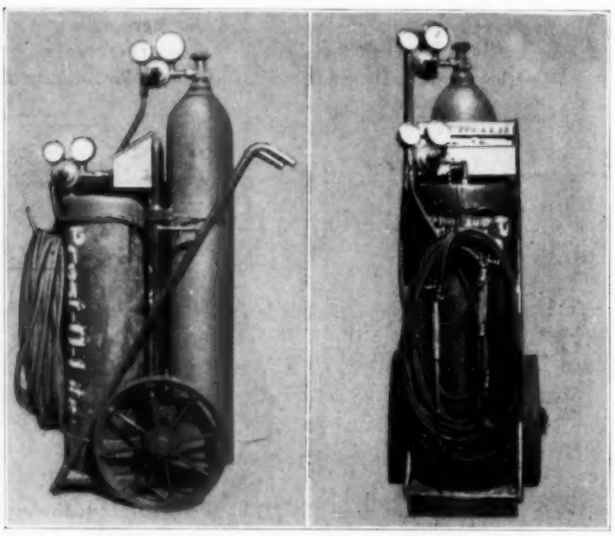
The real significance of this repair job is not so much to be found in the fact that through the application of welding a possibly dangerous sag and pulling apart of the building has been prevented at a nominal cost, but rather in the fact that it shows the probable extent to which welding may be applied in construction of the future.

As engineers gradually came to a better understanding of

the possible application of welding, this method of joining members will replace the older one of riveting. Riveted pieces were unsuccessful when applied to the condition that existed in this plant, because they did not supply the strength necessary to withstand the strain imposed upon them by the gradual pulling away of the factory unit.

NEW TORCHWELD CYLINDER TRUCK

A new truck for transporting oxygen and acetylene cylinders around the yards or shop has recently been developed by the Torchweld Equipment Company, Chicago, and was exhibited in their booth at the Convention of the Master Boiler Makers Supply Men's Association, held in the Hotel Sherman during the week of May 18th. As shown by the



New Torchweld Cylinder Truck

photograph, the truck is so constructed that the cylinders ride one in front of the other instead of side by side. This makes it possible to carry the welding outfit around where there is very narrow clearance. The manufacturers have been very careful to see that it is well balanced so that it rolls along very easily. The fact that it is of welded construction throughout is sufficient guarantee of strength and durability. When the welding outfit is in use a brace at the bottom is set so that the entire equipment is held perfectly rigid. It is equipped with a set of chains to hold the oxygen and acetylene cylinders firmly in place and has a tool box conveniently located above the acetylene cylinder.

BOOK REVIEW

Metallurgy of Aluminum and Aluminum Alloys by Robt. J. Anderson—An important and practical treatise on metallurgy of aluminum and its light alloys covering the subject from mining of the ores to the fabrication of the metal and the applications thereof. 944 pages, 295 illustrations, cloth binding, price $10.00. Published by Henry Carey Baird & Company, 2 West 45th St., New York City. This work should be of great help to not only metallurgical engineers and foundrymen but also to mechanical engineers interested in specific applications of the metal and its alloys. It is practical enough for use in the factory and at the same time thorough enough to be suitable as a text book. The text gives an introductory survey of the history of this metal then discusses in order the mining and production of aluminum, its physical and chemical properties, the subject of corrosion, a discussion of the many alloys, their uses, applications and preparation, aluminum melting practice, production of secondary aluminum and alloys, foundry practice, casting losses and defects, production of die castings, rolling and other mechanical treatment, heat treatment, soldering, welding, drawing, finishing, machining and electroplating.

PROF. KINSEY TALKS AT A. S. M. E.

At the Monday meeting of the A. S. M. E. which opened the program of the Annual Spring Meeting of that organization held this year in Milwaukee, Wisconsin, Prof. A. S. Kinsey, of Stevens Institute of Technology, made a short and interesting talk to the members in which he outlined the progress which had been made in perfecting the process of manufacturing oxygen by the air liquefaction process. He also called attention to the more important uses of this gas and the immense possibilities for effecting economies in many industries by extending the use of the oxy-acetylene process as far as possible.

WELDING FAVORED FOR REFRIGERATING SYSTEMS

While the A. S. M. E. was having its meeting in Milwaukee during the week of May 20th, the American Society of Refrigerating Engineers was in session in the same city. In one of the papers on the subject of design and methods of construction of shell and tube type ammonia condensers, Mr. L. H. Burkhart, the author, expressd himself as decidedly in favor of electric welded joints stating that when such joints are made in a first class shop he considers them as safe as any other type of joint. When asked whether the whole shell was reheated to take out the stress he stated that he considered reheating a real detriment, that the weld was best the way it came from the arc.

C. G. M. A. SPRING LUNCHEON AND MEETING

The enjoyable get-together luncheon of the Compressed Gas Manufacturers' Association held at the Hotel Astor, New York City, on May twenty-first, was followed by presentation of committee reports that reflected especial activity and progress. Standardization of valve threads, measurement of gases, the eastern trunk line rate investigation and the sale of cylinders to scrap metal dealers were among the subjects covered by committee reports.

The meeting adjourned following the adoption of a resolution recording appreciation of the services of past President A. Cressy Morrison during his recent administration.

G. P. A. CONVENTION RESERVATIONS COMING FAST

C. T. Allen, Secretary of the Gas Products Association, Chicago, states that the number of reservations already received for the Summer Convention, which is to be held at Mackinac Island, indicates that the attendance at this meeting will undoubtedly be as large as usual with a good possibility of breaking previous records. Since a whole lot of consideration has been given to make this as much of a real pleasure trip as possible, it is quite certain that the week of July 20th will not be a week of strenuous work in the middle of the summer, although the Association has a reputation for outlining constructive programs for its meetings. It is desired to have discussions of several live and interesting subjects and also some papers which will be of value to the members and their guests. The Secretary has urged all those who intend to be present at the convention to make reservations at the earliest possible date so that there will be no difficulty in securing accommodations on the boat and in the hotel for all those who wish to attend.

News of the Welding Trade

A one story addition will soon be under way for the plant of the Air Reduction Sales Company, 123 Mount Vernon St., South Boston, Mass. At the same time a number of improvements will be made to the present plant.

All of the principle acetylene engineering firms in France were represented by exhibits at the exposition recntly held at Greenoble, France. Provisions were also made by the French Acetylene Association to give demonstrations of the various processes.

It is reported that a firm in Brussels has produced a new type of radiator for central heating. The radiators are made by welding tubes and plates and its construction is not only suitable and light but highly efficient.

Chicago members of the welding industry had the opportunity to exercise their hospitality during the week of June 8th for quite a number of out of town celebrities who were here on business and pleasure. The list of visitors included Mr. C. E. Phillips, Purox Company, Detroit; Mr. J. J. Kelly, Shawinigan Products Corp., New York City; Mr. W. H. Joyce, Harris Calorific Company, Cleveland; Mr. Willard Foster, and Mr. Fred Heppel, Tulsa Oxygen Company, Tulsa, Okla.; Mr. Sherman, of the Magnolia Gas Products Company, Houston, Texas, and Mr. M. M. Smith, of the Commercial Acetylene Supply Company, New York City.

M. J. Andrews and Ray J. Olds, Moline, Illinois, have recently purchased the Moline Boiler Works at 9th St. and Railroad Avenue, and will operate the business under the name of the Andrews and Olds Boiler and Welding Company.

Mr. A. J. Russell, of the Bettendorf Oxygen-Hydrogen Company, stopped at Chicago on the 18th and 19th to spend the money he won on the Kentucky Derby the previous Saturday before proceeding home to Davenport.

The office of the Transportation Engineering Corp., moved from 909 E. 134th Street, New York City, to 269 37th Street, Brooklyn.

It has been reported that the U. S. Light and Heat Corp., has recently sold the Safety Car Heating and Lighting Company all of its patents, machinery and equipment connected with car lighting. This does not include the U.S.L. arc welders or U.S.L. batteries so the U. S. Light and Heat Corporation will continue to sell arc welders and batteries, including lighting batteries.

A new welding shop was recently opened by Geo. Breckner in Alliance, Nebraska.

F. A. Martin and E. C. Martin, Cincinnati, Ohio, recently incorporated for the purpose of conducting a welding shop which will be operated under the name of the Ideal Welding and Manufacturing Company.

The Chicago office of the Thompson Electric Welding Company has moved from 817 Washington Blvd., to Room 514, Machinery Hall Mr. F. H. Leslie is in charge. Announcement has also been received that Mr. James Moyer with headquarters in the General Motors Bldg., will represent the Thompson Company in Detroit and that Mr. C. E. Seiffert and Mr. M. G. Littlefield will open a new office at 852 Leader Bldg., Cleveland. Arrangements have been made to discontinue the Cincinnati office.

Special attention is given to a wide range of engineering courses at the summer session of the Carnegie Institute of Technology which includes both theoretical classroom instruction and shop practice. Plans have been made to include a thorough course in welding in the work of the College of Industries.

E. Dolata and H. B. Milward recently organized a new firm known as Buffalo Acetylene Welding Company, Buffalo, New York.

The Combustion Utilities Corporation has moved its general offices from 8 Bridge Street to 60 Wall Street, New York City. The telephone number has been changed to Hanover 1600.

Classified Ads

Help Wanted—75c per line, minimum 4 lines.
Jobs Wanted—4 lines free.
Other Ads—$1.00 per line, minimum 4 lines.
Counted 8 words to line. Add 6 words for keyed address

Welders—We have several openings for first class electric welders. Must be thoroughly experienced. Highest wages, steady work all year around. Address 64, care *The Welding Engineer.*

For Sale—Welding Shop, town of 15,000, established nine years, doing good business in electric and acetylene welding, fully equipped. Selling on account of sickness. $5,500.00. Address P. O. Drawer No. 704, New Haven, Conn.

For Sale—220 volt, 3 phase, 60 cycle motor driven Wilson Plastic Arc Welder set, fine condition. Price $600.00 complete. Address C. H. Sherwood, 67 W. Cardott St., Ridgway, Pa.

Wanted—Good Oxy-Acetylene Welding Demonstrator and Salesman. Must be favorably known in Chicago district and able to furnish satisfactory references. This is an excellent opportunity to make permanent connection with a well established welding apparatus manufacturer. Give all details in first letter. Address 65, care The Welding Engineer.

For Sale—Only exclusive welding shop in thriving town of 16,000 people. One of best locations in the northwest. Best of equipment, good business. This shop should pay for itself in twelve months. Address F. E. Bliss, 508 Washington street, Vancouver, Washington.

Wanted—A good electric welder who has had some selling experience, can make a lot of money by investigating this offer. Write today to box 60, care The Welding Engineer.

Position Wanted—All-around oxy-acetylene and electric welder who also is an experienced machinist and at present employed wants a new connection. Have had plenty of practical experience and can furnish the best of references. Address 61, care The Welding Engineer.

Position Wanted—Welding Engineer, can plan, estimate and supervise all classes of repair and production work in either oxy-acetylene or electric welding field. Best of references. Address 62, care The Welding Engineer.

Wanted—Thoroughly able technical and practical writer of ads, descriptive matter and technical articles upon welding and cutting apparatus, either part or whole time. Address in confidence, giving full particulars to Box 6464, Manufacturers Record, Baltimore, Md.

Wanted—Welder who thoroughly understands electric arc welding to demonstrate alternating current arc welding machine. High school education with practical experience necessary. Give age, experience and salary expected first letter. Address 63, care The Welding Engineer.

Position Wanted—Acetylene Weider, 10 years experience, desires position as supervisor, or connection with Executive Department of Supply House. Address A. W. Young, 819 Trimble Ave., Kalamazoo, Mich.

For Sale—Oxy-acetylene and Spring Repair shop. Good location; no competition. Address P. O. Box 471, Somerset, Pa.

For Sale—Only exclusive welding shop in city of 30,000 population; up to date electric and acetylene apparatus and machine tools. Two man shop, now doing a gross business of $1,400.00 monthly. We are asking $6,500.00 for this real bargain; will invoice at $7,500.00. Be sure to investigate this. Write The Electric Welding Works, 325 Motorway, Santa Barbara, Calif.

WELDING SUPPLY DEALERS

Do your customers know how best to use the apparatus you sell them? The best way you can serve them in this respect is to furnish them The Welding Engineer, and The Welding Encyclopedia. Write for our plan.

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Put a WODACK Finish on Welded Joints

"Welded joints" means strong, one piece, leakproof construction. Dress them with a WODACK and you can't find the weld. They'll take the finest kind of finish, too. Every production welder needs a WODACK Portable Electric Grinder for this work. For job welders we recommend the WODACK Combination Portable Electric Drill and Grinder.

Write for full information

Manufactured by Wodack Electric Tool Corporation
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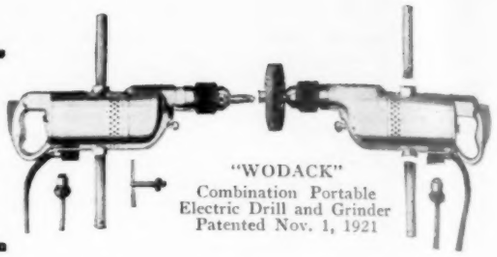

"WODACK"
Combination Portable
Electric Drill and Grinder
Patented Nov. 1, 1921

CURRENT WELDING LITERATURE

OVERHEATING IN ACETYLENE GENERATORS—Discussion of a paper read before the Institution of Welding Engineers by Charles Bingham, C. E.—The Welding Journal, London, May.

ECONOMIES THROUGH THE USE OF HIGH PURITY OXYGEN IN CUTTING, by J. J. Crowe and eGo. L. Walker.—Reproduction of a paper read before the American Welding Society dealing with the history of oxygen producing and descriptions of tests conducted to show the time required and the amount of oxygen consumed in cutting operations made under identical conditions with the exception of variations in the purity of the oxygen, ranging from 97.5% to 99.5%.—The Welding Journal, London, May.

INSTRUCTION MANUAL.—The Lincoln Electric Company, Cleveland, Ohio, have just published a new electric arc welding instruction manual. This manual contains a description of their apparatus and supplies used for arc welding with suggestions for proper methods of using them and taking care of them. Two pages are devoted to the subject of the design of welded joints with illustrations of various types of joint design. Then there is an instruction course of nine lessons covering apparatus, starting the arc, building up with the arc, welding plates, welding thin plates, welding pressure vessels, miscellaneous jobs, flue welding and carbon arc welding. These lessons are supplemented by a chapter of suggestions for welding procedure covering such jobs as tank steel, pressed steel, high speed steel, automobile frames, iron castings, cylinders, water jackets, alloy steels and nonferrous metals. The manual covers 83 pages in a pocket size book printed on heavy paper with a strong cover.

SELECTION OF QUALIFIED WELDERS, by Herman Ulmer.—When some unusually large and important welding jobs were started it became necessary to secure some first class welders. The candidates were procured by advertising in local papers and each one was called upon to weld on test pieces. The rigid inspection methods aroused keen interest on the part of the welders and this was kept up by continuing to inspect their work. When an unusually large number of welders would be required arrangements were made to supplement the supply of skilled welders by bringing in new men on the work. It was found that men accustomed to miscellaneous welding were rather slow on the production work.—Acetylene Journal, June.

PROCEDURE CONTROL IN WELDING A STORAGE TANK.—The considerations involved in fabricating storage tanks are to check the experience and qualifications of welders, to outline specifications for the material to be welded and the welding rod to be used, to design and layout the joints which will give best results when welding, to provide proper preparation of the plates for welding, to have a standardized welding technique and to arrange for tests on completed tanks.—Acetylene Journal, June.

ACETYLENE GENERATORS.—Types of generators, description of acetylene generator and principles of design, operating rules, heating and lighting generator house, caring for the sludge, generator repairs and who should make them, workroom exercises for student welders.—Acetylene Journal, June.

REGO AUTOMATIC SHUT-OFF TORCHES.—The Bastian-Blessing Company, Chicago, are mailing a folder printed in three colors illustrating the Rego Automatic Shut-Off Torch, giving prices on individual torches and oxy-acetylene welding outfits.

CORROSION OF ALUMINUM AND ALUMINUM WELDS, by G. LeGris.—A description of a test made on small pieces of aluminum rods to determine their resistance to corrosion. Test pieces were of varying degrees of purity and the results of the experiment showed the superiority of pure aluminum as far as resistance to corrosion was concerned.—Revue de LaSoudure Autogene, April.

TAYLOR SPOT WELDERS—The Taylor Welder Company, Warren, Ohio, are mailing a folder which describes in detail the new "N" Type Taylor Spot Welders. The folder illustrates the complete machine and gives views of a number of important parts. Specifications are also included.

PIPE WELDING AT WESTPORT STATION.—About four thousand joints have been made at the Westport Station of the Consolidated Gas, Electric Light and Power Company, Baltimore, since 1912, including about 2,700 on steel pipe. Welded joints show marked savings because of the ease of making changes or replacements. A more important consideration, however, is the convenience of erection, alignment, etc. In a recent addition to the station about 90% of the bolt flanges usually employed were eliminated in favor of welded joints and much of the pipe here is made up from that of a former installation. The work of all welders is tested at regular intervals. Miscellaneous repair work is carried on to great advantage.—Power, June 9th.

MATTICE SHORT ARC WELDING SYSTEM.—A series of folders published by the Mattice Engineering Co., Inc., Philadelphia, illustrates the Mattice Welding Generator and gives photographs and description of a number of difficult repair jobs accomplished by this process.

BUILDING MACHINES BY WELDING.—Examples that show the possibilities of using welded members in the construction of machinery. Welding makes it possible to use steel in a number of cases where expensive and heavier iron castings have been used in the past. There are many opportunities of effecting economies in the tool room by using the welding process in constructing jigs and fixtures. Welded structural members have stood up better than riveted joints in several tests.—Machinery, June.

PUROX WELDING AND CUTTING APPARATUS.—New 54 page loose-leaf catalog just published by the Purox Company of Denver, Colorado, describes and illustrates a complete line of oxy-acetylene welding and cutting apparatus and supplies. Especial attention is given to illustrate some of the more important parts of the welding and cutting torches. Tables of working pressures and gas consumption and tables showing properties of oxygen, hydrogen and acetylene and some of the properties of the commercial metals are also given. A separate table suggests the sizes of welding rods to be used for welding different thicknesses of steel and cast iron.

AUTOMATIC ARC WELDING.—A resume of the uses and value of automatic arc welding, together with a description of the welding apparatus and generating equipment used, is given in a bulletin bearing the number 48937.1 and entitled "Automatic Arc Welding" recently issued by the General Electric Company, Schenectady, N. Y. This is an attractive 20 page, paper bound booklet, well illustrated by photographs of equipment and actual applications.

THE ACME SHIELD.—A four page folder issued by the Chicago Eye Shield Company, describing a new type of transparent shield for the protection of the eyes of workmen engaged in grinding operations.

MILBURN WELDING AND CUTTING APPARATUS.—A new edition of the Milburn pocket size catalog describing the Milburn line of oxy-acetylene welding and cutting torches, generators, regulators and supplies.

OXY-ACETYLENE TIPS.—Monthly publication of the Linde Air Products Company, May issue, contains the following features: Foundry Saves Imperfect Castings, How Lead Welding was applied in the construction of the Tribune Tower, Power Transmission Equipment Repaired, Fabrication of Pumping Jack Bases from Second Hand Pipe, Protecting Heat Treated Steel While Welding, Procedure Control in Welding a Storage Tank, Producing and Maintaining Automobiles, Salvaging Shears, Welded Joints Withstand Severe Strength Test.

WELDING WITH BRONZE.—The necessity for using bronze in making repairs on malleable castings and the developments of methods for brazing in connection with various types of cast iron.—Smithograms, April.

Distributor Wanted for

Autogenous Welding and Cutting Apparatus

Unrivalled in quality, design and price.
Manufactured by large first-class German firm.

Cuts Steel Up to 31 Inches

Exclusive agency for importation and distribution will be granted

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ASSURED SAFETY

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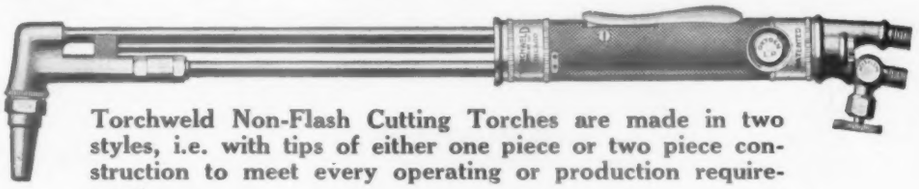
These Anti-Flashback features are patented and are found exclusively in Torchweld Torches.

In addition to the Anti-Flashback features which prevent the flame propagating into the torch, Torchweld Cutting Torches have built into them a safety back pressure valve which prevents the mixed gases used for preheating being forced back into the high pressure Oxygen line.

Your Cutting operations are doubly safeguarded by Torchweld Cutting Torches.



Torchweld Non-Flash Cutting Torches are made in two styles, i.e. with tips of either one piece or two piece construction to meet every operating or production requirement.

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TORCHWELD EQUIPMENT COMPANY

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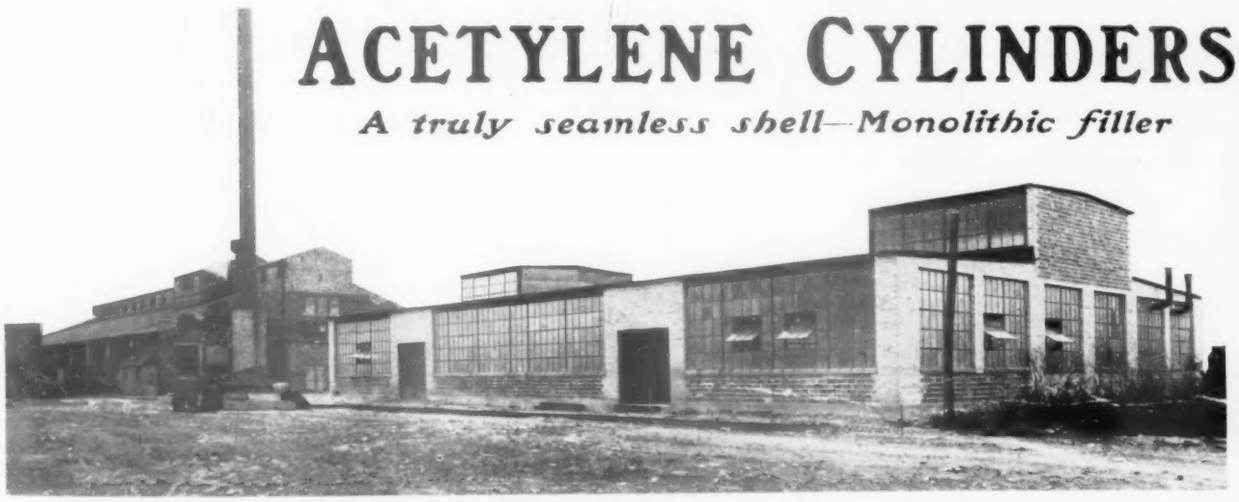
A truly seamless shell—Monolithic filler



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OUR seamless steel acetylene cylinder shells are made entirely in ONE piece and offer definite advantages over any built-up or assembled type of shell.

Mono (one) lithic (stony) filler is a porous mass held together by cement so that the interior of the cylinder is completely filled with one piece of hard, porous, stone-like material.

Voids cannot occur in such filler, as it cannot sag or disintegrate.

Some acetylene users who have investigated this matter now demand monolithic filled cylinders.

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MADE IN ALL DIAMETERS, LENGTHS AND SIZES

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Reduce your labor costs.
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Increase your production.
Increase the operators' efficiency.
Increase the quality of your welds.

Write for details.

The new Tecor Specialties Bulletin describes the WANAMAKER COATED ELECTRODES, also a complete line of welding accessories.

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No matter what the job is, there is a SWEDOX product especially made for it. We sought and obtained from the nation's expert metallurgists and welding engineers the best analysis for each task. Science has put into SWEDOX rods and wire the proven betterments that make them the recognized standards in every case.

You'll find SWEDOX products free from impurities, uniform in analysis and therefore economical because their use reduces the cost of application and of machining.

We'll send you a sample, at our expense, enough for a thorough test—one which should prove to you, as thousands of welders know, that SWEDOX products are the standards.

SWEDOX booklet describing the products and their uses in detail, will gladly be sent upon request. Address department 4.

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for a new General Electric welding set—WD 10A. Motor wound for 3 phase, 220 volts, 60 cycles. Operates on other power supply at small additional cost, also Mathews 20 Horsepower Gasoline Engine Driven Welding Set Type W. D., 200 amperes, 620 volts, 1200 R. P. M. at $1500 complete.

Our "Arctrode" Welding Electrodes give good results on cast iron

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"We Stock all kinds of welding supplies"

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"M-W" WELDING RODS

We are able to offer you copper coated oxy-acetylene and bare electric welding wire at reasonable prices—made from commercially pure iron that receives as much care and attention from the raw material to the finished article as high grade tool steel. Every pound is GUARANTEED to be absolutely uniform, each rod as uniform as two silver dollars—in five pound or five ton lots.

In writing for samples, or ordering a trial lot, specify Toncan. Give us an opportunity to convince you of a policy and product that is right.

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All "Raco" Welding Wires are guaranteed to meet the American Welding Society specifications in every particular, and in addition are subject to rejection from any cause whatsoever.
The well established policy of THE REID-AVERY CO. to specialize in welding wire only insures absolute satisfaction to our customers. Lowest prices consistent with unvarying quality, prompt attention to orders, unlimited guarantee.

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HIGH CARBON, for both Arc and Acetylene Welding

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Stoody's Selfhardening Alloy Steel Welding Rods
For Electric For Acetylene

Deposits a hard tough non-machinable surface, having highest abrasive resistance.

Maximum Wearing Qualities
For use on

Railroad crossings, frogs, rail-ends, ore crusher jaws, dredger teeth, cable and rotary oil well tools, agricultural implements, tractor tracks, and wherever a hard tough non-machinable surface is desired.

Does not require heat-treating.
Easy to apply in any position.
Does not blister or boil and welds perfectly to manganese and other steels.

Manufactured by
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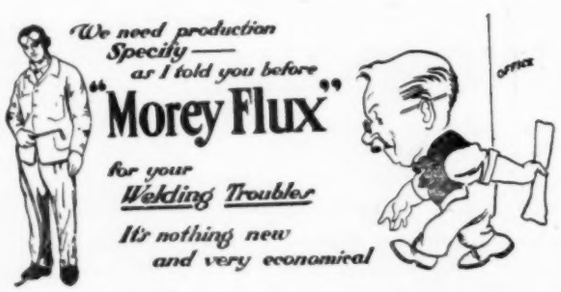

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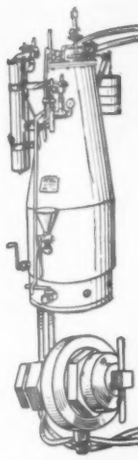

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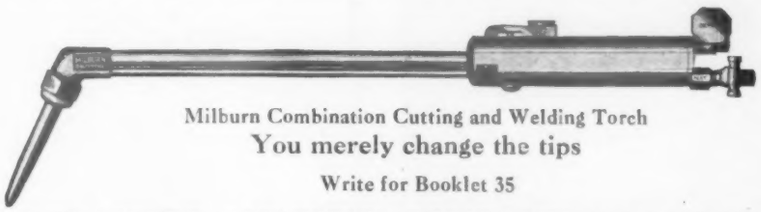

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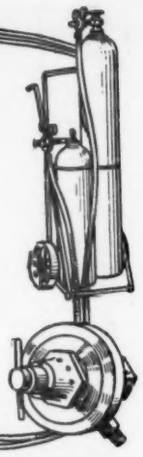

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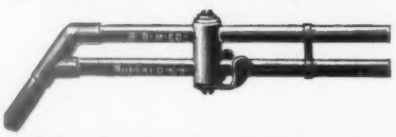

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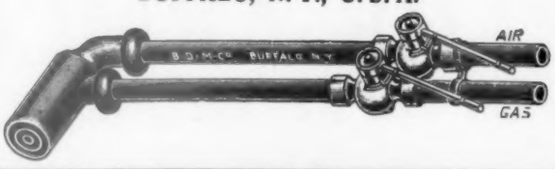

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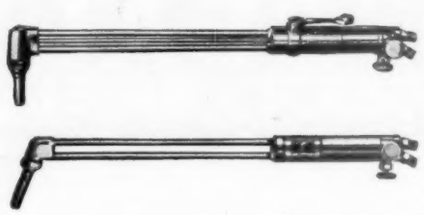

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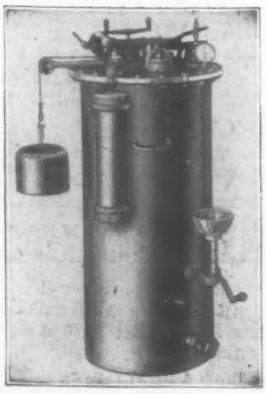

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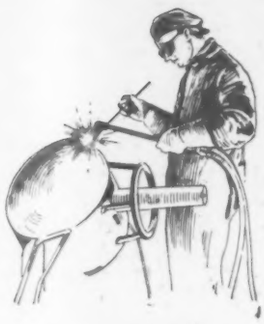

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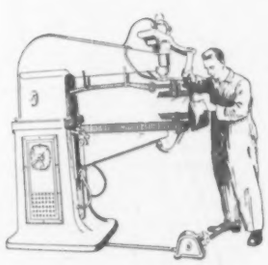

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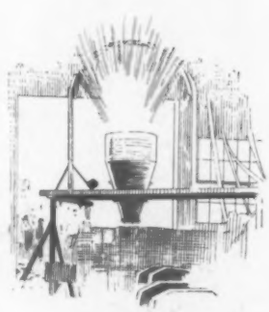

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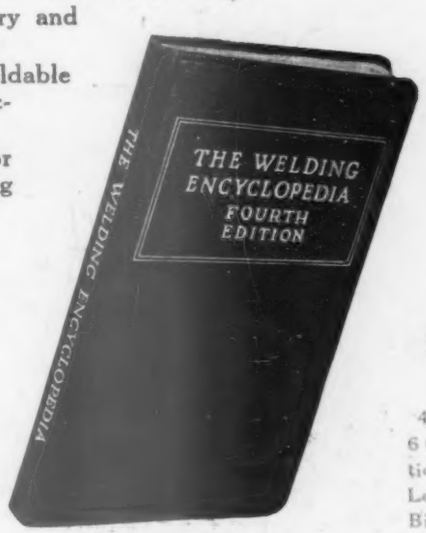

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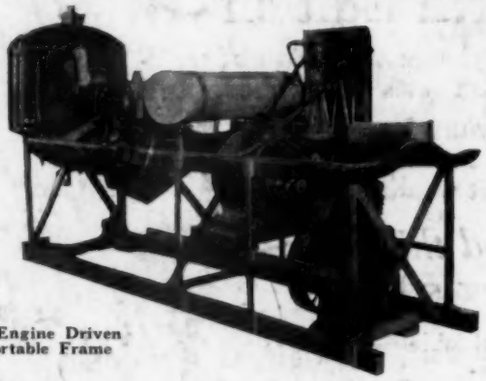

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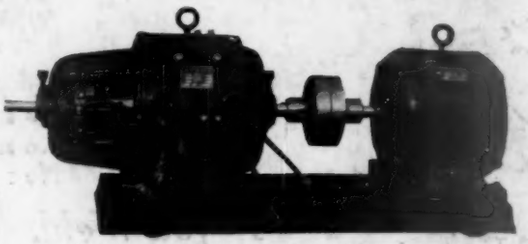

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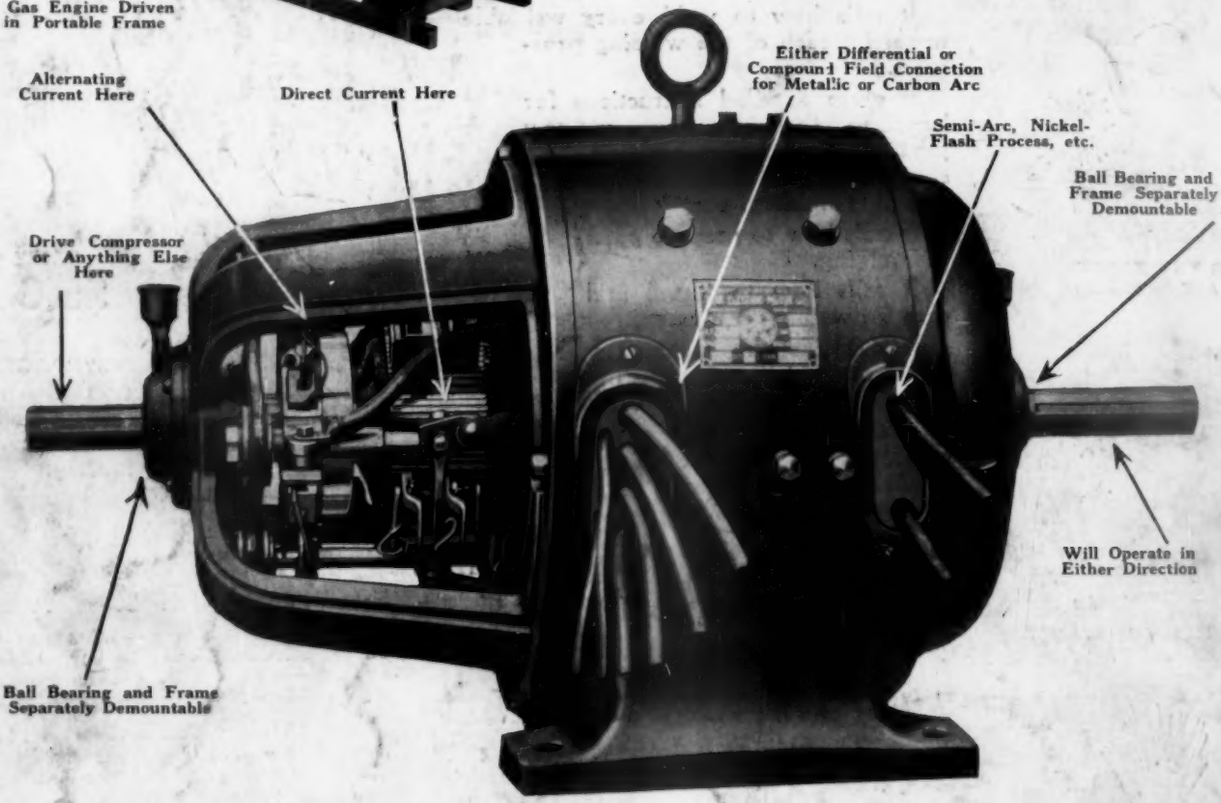
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